

Appendix K

Monitored Natural Attenuation Technical Memo

ENSR

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Memorandum

Date: October 19, 2006
To: Project File
From: Shamim Wright/ ENSR; Elizabeth Perry/ ENSR
Subject: Monitored Natural Attenuation (MNA)
Evaluation of the Ingersoll Rand (IR) Facility
in Phillipsburg, New Jersey

Distribution: _____

This technical memorandum discusses the MNA Evaluation that was conducted for the IR facility in Phillipsburg, New Jersey ("site"). Refer to Figure 1 for the Site Location Map and Figure 2 for the Site Plan). The objective of the MNA evaluation is to evaluate whether natural attenuation of the chlorinated volatile organic compounds ("CVOs") in groundwater may be occurring. The protocol for this MNA Evaluation is based on the USEPA Natural Attenuation Screening Process and evaluation of Lines of Evidence as identified by the OSWER (Office of Solid Waste and Emergency Response) Directive 9200.4-17 (1997). Both are discussed in the September 1998 USEPA Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water. Both the screening process and the lines of evidence evaluation are important elements in determining if natural attenuation of CVOs is occurring at the site. Groundwater data used for this evaluation includes historical volatile organic compound ("VOC") data from April 2002 to May 2006 and geochemical data collected during two focused groundwater sampling rounds in October 2005 and May 2006.

Presented in this Technical Memorandum are summaries of the groundwater data collection procedures and results, the USEPA Screening Process description and results, the lines of evidence description and results, and conclusions of the MNA evaluation.

Groundwater Data Collection and Results

Semi-annual monitoring activities have been conducted in accordance with ENSR's February 2002 GW-RIWP, the February 2002 Quality Assurance Project Plan (QAPP), the Technical Requirements for Site Remediation, (N.J.A.C.7:26E), the May 1992 Field Sampling Procedures Manual, the 1997 SRP article "The Low Down on Low-Flow", and EPA's April 1996 Low Flow Groundwater Sampling Procedures. Groundwater monitoring was conducted for select wells using conventional purging and sampling, low-flow purging and sampling, and/or passive bag sampling.

Groundwater monitoring for VOCs generally occurred during April and October of each year from 2002 to 2006. Groundwater samples were analyzed for VOCs. See Table 1 for VOC analytical results from 2002 to May 2006. During groundwater sample collection via conventional and low flow methods in the field, select physical parameters were obtained including pH, oxidation reduction potential ("ORP"),

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dissolved oxygen ("DO"), temperature, conductivity and turbidity. Also, geochemical parameters, including heterotrophic bacteria, were sampled and analyzed for during two groundwater monitoring rounds in October 2005 and April 2006. Refer to Tables 2a/2b (2005) and 3a/3b (2006) for the physical parameters data from 2005 and 2006, geochemical parameters data from 2005 and 2006, and a select list of VOCs (from 2004 to 2006).

Groundwater samples have been analyzed for VOCs for many years prior to 2002. It was decided to incorporate only the data from 2002 to the present, because of consistency in sampling methods and data management.

EPA Natural Attenuation Screening Process

The EPA screening process is a method that allows the investigator to evaluate through a numerical ranking system if there is evidence for natural biodegradation of CVOCs to be occurring in the environment. For most chlorinated solvents, specifically tetrachloroethene and 1,1,1-trichloroethane and their degradation products, reductive dechlorination is the initial form of degradation that occurs in an anaerobic environment. The screening process is designed to recognize geochemical environments where reductive dechlorination is plausible. However, the screening process also recognizes that degradation of select CVOCs can occur in aerobic environments as well. The screening involves comparing the site-specific data to EPA-assigned target ranges and applying points to each parameter based on how the data results compare to the EPA value. The sum of these points provides an indication about the feasibility of biodegradation occurring on the site; the higher the sum, the greater the chance that natural attenuation "NA" is occurring. For further details, refer to Attachment A for copies of the relevant pages from the September 1998 USEPA Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water.

The USEPA screening process was conducted using two data sets; October 2004/April 2005 CVOC and October 2005 geochemical data and May 2006 CVOC and geochemical data. A summary of the data is provided in Tables 2a/2b and 3a/3b. Results for the screening process is provided in Table 4 and the individual scoring sheets for each monitoring well are included in Attachment B.

The screening results suggest the full range of biodegradation, from inadequate to strong in various wells. Wells with "inadequate evidence" results are located along the southern portion of the Site (MW03, MW06, MW30, MW33A, MW34, MW35, MW37, MW49, MW51A, MW53), background wells (MW42 and MW47) along the north edge of the Site, wells east of the Site building (MW12, MW18, MW20) and wells located west of the main site building (RW13 and MW16). Monitoring wells that have "limited evidence" results include MW4 and MW53 (2006 data), located south of the main site building; and MW20 (2006 data), located along the east side of the Site. The scoring indicates that the potential conditions for biodegradation to be occurring at these three wells are redox conditions and daughter products for MW4 and redox conditions at MW20 and MW53. Screening results for two wells (RW09 and RW16) located at the main Site building indicates adequate to strong evidence for biodegradation based on solid evidence for redox conditions and daughter products in both 2005 and 2006. Monitoring well RW09 results were strong and adequate for 2005 and 2006, respectively, and monitoring well RW16 results were strong for 2005 and 2006.

Lines of Evidence

The OSWER Directive 9200.4-17 (1999) identifies three lines of evidence that can be used to evaluate natural attenuation of chlorinated hydrocarbons as follows:

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- (1) Historical groundwater and/or soil chemistry data that demonstrate a clear and meaningful trend of decreasing contaminant mass and/or concentration over time at appropriate monitoring or sampling points.
- (2) Hydrogeologic and geochemical data that demonstrates indirectly the type of natural attenuation processes active at the site, and the rate at which such processes will reduce contaminant concentrations to required levels.
- (3) Data from the field or microcosm studies which directly demonstrate the occurrence of a particular natural attenuation process and its ability to degrade the contaminants of concern.

It is not necessary to analyze all three lines of evidence. The OSWER Directive provides guidance that states that each line of evidence be evaluated depending on if the prior line of evidence is not sufficient to make a determination of whether natural attenuation is occurring. For example, if the historical groundwater data evaluation as identified in Item (1) is not sufficient, Item (2) would be evaluated and so on.

For this MNA Evaluation we evaluated Item (1) trends in concentrations in groundwater over time and Item (2) evaluation of geochemical data for reductive dechlorination. Also, samples from monitoring wells were analyzed for heterotrophic plate count as an indicator of the presence of microbes.

Historical Groundwater Data Trend Analysis

Trend analysis plots were generated for VOC data from 2002 and 2006 detailed in Tables 1, 2a, and 3a/3b. Refer to Attachment C for trend plots of all the monitoring wells. The CVOC results for some monitoring wells were all non detect ("ND"), therefore no trend was observed. These wells include MW12, MW18 and MW20 (located east of the main Site building); MW42 and MW47 (background wells located on the north side of the site); MW51A (west side of the Site), MW53, MW30 and MW49 (located on the south side of the site). The remaining monitoring wells show decreasing trends, seasonal fluctuations and/or current stable concentrations with or without decreasing trends at earlier dates (prior to 2002). During the following description, tetrachloroethene ("PCE") and associated daughter products (i.e., trichloroethene ("TCE"), trans-1,2-dichloroethene ("trans-1,2-DCE"), 1,1-dichloroethene ("1,1-DCE"), cis-1,2-dichloroethene ("cis-1,2-DCE"), vinyl chloride ("VC")) are referred to as *ethenes* and 1,1,1-trichloroethane ("1,1,1-TCA") and associated daughter products (i.e., 1,1-dichloroethane ("1,1-DCE"), chloroethane ("CA")) are referred to as *ethanes*. Detailed observations for each of the monitoring wells are listed below in the following table. A summary of observations for each well is included in Table 4. A summary of trends observed in each area is following this table.

Monitoring Well	Area on Site	Trend Analysis Results for 2002-2006 CVOC data
MW03	South side	Chlorinated ethenes and ethanes: Relatively stable concentrations over time, slight increase in recent sampling events. All concentrations less than 5 ug/l.
MW04	South side	Chlorinated ethenes: Seasonal concentration fluctuations observed. Highest concentrations in fall (October) and stable over time.

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		Chlorinated ethanes: Generally decreasing over time.
MW06	Southwest side	Ethenes and ethanes: Generally decreasing from 2003 to the present.
MW16	West side of main building	Ethenes and ethanes: Fluctuating levels, possible increase in recent sampling events.
MW33A	Southwest side	Ethenes and ethanes: Decreasing concentrations over time from 10/2002.
MW34	Southwest side	Ethenes and ethanes: Decreasing over time since 2003.
MW35	Southwest side	Ethenes: Decreasing trend. Ethanes: Fluctuating concentrations - concentrations remaining within consistent range of concentrations since 2002.
MW37	South side	Ethenes: Decreasing trend observed for TCE. Carbon tetrachloride concentrations present with decreasing trend observed also.
RW09	Main site building	Ethenes: Generally decreasing trend over time. Fluctuations of daughter products (vinyl chloride) lag parent (cis-1,2-DCE) by about 1 year. Ethanes not present.
RW13	West side of main building	Ethenes and ethanes: Well not consistently sampled. Possible increase in recent sampling events.
RW16	Main site building	Ethenes: Seasonal influence. Stable to decreasing concentrations. Ethanes: fairly stable with slight fluctuations.

In summary chlorinated ethene concentrations are exhibiting the following behavior:

- Main site building - slowly decreasing over time with some fluctuations;
- West of the main site building - decreasing over time with some fluctuations (seasonal variations in MW16), approaching stable conditions;
- South side of the Site – Each well exhibits different behaviors. Stable with slight increase in October 2005 in MW3; fluctuating concentrations in a consistent range in MW4 with seasonal variations; decreasing trend for TCE and carbon tetrachloride in MW37.

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- Southwest side of Site – Decreasing trend with concentrations approaching stable in MW6.

In summary chlorinated ethane concentrations are exhibiting the following behavior:

- Main site building – Stable concentrations in RW16 with all values ND in RW09;
- West of the main site building – Stable concentrations until April 2005 when concentrations rise through May 2006.
- South side of the Site – Stable to decreasing trend. Increasing fluctuation in MW3 in October 2005. No chlorinated ethanes detected in MW37.
- Southwest side of Site – Decreasing to stable concentrations in all wells except MW35 which has fluctuating concentrations in a stable/consistent range.

Geochemical Data Evaluation

The USEPA screening process provides a formal way of evaluating this line of evidence. The results of the screening are presented above. Monitoring wells MW42 and MW47 are considered background wells. In general, the evaluation of the geochemical results in combination with CVOs, in particular PCE and 1,1,1-TCA and associated daughter products, indicate conditions are highly favorable for natural attenuation to occur at MW04, RW09 and RW16; moderately favorable for natural attenuation to occur at MW03, MW16, MW35, MW53 and RW13; low to moderately favorable for natural attenuation to occur at MW20, MW33A and MW34; and not very favorable for natural attenuation to occur at MW06, MW12, MW18, MW30, MW37, MW42, MW47, MW49 and MW51A. Note that CVOs are not detected at most of these last wells.

With respect to the areas of the site, the 2005 and 2006 geochemistry data indicate conditions are not amenable to NA east and north of the main facility and in select areas south/west of the Site (i.e., south and east of MW4, the west edge of the site (MW51A), and MW06); moderately amenable to NA in select areas on the south/west side of the site and on the southwest side of the main facility; and very amenable to NA at the main site building and at MW04 (south side of the Site).

Heterotrophic Plate Count

The heterotrophic plate count potentially provides information, in conjunction with other geochemical data, regarding the presence of food source and if aerobic or anaerobic conditions are present. The plate count laboratory analysis was for aerobic bacteria, but there are bacteria that modify themselves based on subsurface conditions (i.e., change from aerobic to anaerobic in reducing conditions). Wells with very low plate counts in both October 2005 and April 2006 include MW04, MW06, MW12, MW18, MW20, MW30, MW34, MW42, MW47, and MW49.

Following is an itemization of monitoring wells with moderate to high plate counts and the potential reasons for the higher levels in each individual well. In reviewing the difference in data between October 2005 and April 2006 for the following wells, no specific cause was identified for the differences. No specific causes were identified for high to moderate plate counts in different areas of the sites besides the higher bacterial activity possibly accounting for the observations that natural attenuation is possibly or very certainly (depending on the well) taking place. However, there are monitoring wells (specifically MW04) with low plate counts with high potential for NA.

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- MW03 - very high levels in April 2006 and low in October 2005. Oxidation reduction potential ("ORP") and DO was lower in April 2006 than October 2005 indicating more reducing conditions in 2006.
- MW16 - moderately high in April 2006 and low in October 2005. ORP and DO lower in April 2006 than October 2005 indicating more reducing conditions in 2006.
- MW33A - moderate levels in April 2006 and low in October 2005 with no difference between October and April geochemistry.
- MW35 - moderate in October 2005 and low in April 2006. Higher DO and lower sulfate concentrations in October 2005.
- MW37 - very high in October 2005 and April 2006. DO ranges from 8 – 9 mg/L. Indicates strong microbial activity at this monitoring well.
- MW51A - moderate in October 2005 and low in April 2006. DO and ORP slightly higher in October 2005.
- MW53 - high in October 2005 and moderate in April 2006. High alkalinity in comparison to background in other areas of the site. Slightly higher DO and sulfate and lower ORP in October 2005.
- RW09 – Low in October 2005 and moderate in April 2006. No major differences between October 2005 and April 2006 data.
- RW16 – Low in October 2005 and moderate in April 2006. No major differences between October 2005 and April 2006 data.

Conclusions and Recommendations

The conclusions have been developed based on the analysis of select monitoring wells at the site for the EPA Natural Attenuation Screening Process, the Lines of Evidence including trend analysis and geochemical data evaluation, and evaluating heterotrophic plate count at each monitoring well. When combining the results of each evaluation tool it is evident that natural attenuation is taking place on the site. The evaluation of monitoring wells RW16, RW09 and MW04 indicate strong evidence that NA is occurring near the main facility on the site and on the south side of the site. Favorable geochemistry, presence of daughter products and stable to decreasing trends support this conclusion. Also, the presence of an anthropogenic food source (product) near the main site facility may be increasing NA activity.

Areas of the site where moderate NA activity was observed include MW16 and RW13 (west side of main facility); MW53 (directly north of MW04, no VOCs detected); MW37 (directly south of MW04); and MW33A, MW34, MW35 (along the west side of the southern portion of the Site). This conclusion is due to the observations of decreasing trends and moderately favorable geochemistry/presence of daughter products along the west side of the site, favorable geochemistry at MW53 and decreasing trends at MW37 in the area of MW04, and favorable geochemistry and presence of daughter products at the west side of the main facility.

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Two locations where NA activity was assessed to be low (i.e., MW03 and MW06 – both on the south side of the Site) have stable CVOC concentrations. The stable concentrations indicate the residual contamination has reached steady state conditions indicating concentrations will not increase over time. Since the concentrations present are slightly above (i.e., only TCE is 1.3 ppb at MW06 which is slightly above the GWQC of 1 ppb) or below applicable criteria, continued monitoring of these locations is sufficient as opposed to active remediation.

The locations where the potential for NA was assessed to be low are MW12, MW18, MW20, MW30, MW42, MW47, MW49 and MW51A. All of these areas are not of concern as specified in the following discussion. The area east of the main facility includes MW12, MW18 and MW20 which does not have detectable levels of PCE and 1,1,1-TCA and associated daughter products, therefore this area is not of concern regarding these contaminants. Locations MW42 and MW47 are background wells located on the north and south edges of the Site and were sampled and evaluated for the purpose of assessing background conditions. MW49, MW51A and MW30 all have non detect levels of PCE and 1,1,1-TCA and associated daughter products so these are not areas of concern as well; also, these wells define the extent of residual contamination in select areas of the site. These monitoring wells will continue to be monitored in the future to continue to define the extent of contamination and assess background conditions.

In summary, MNA has been evaluated to be a feasible remedial action for areas of the site that have chlorinated solvent residual contamination present. These areas include the main facility, the south side of the site and the west side of the site.

References

USEPA. April 1999. Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites. OSWER Directive 9200.4-17P.



Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water



TECHNICAL PROTOCOL FOR EVALUATING NATURAL ATTENUATION OF CHLORINATED SOLVENTS IN GROUND WATER

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2.2.1.2.4 Mixed Behavior

As mentioned above, a single chlorinated solvent plume can exhibit all three types of behavior in different portions of the plume. This can be beneficial for natural biodegradation of chlorinated aliphatic hydrocarbon plumes. For example, Wiedemeier *et al.* (1996a) describe a plume at Plattsburgh AFB, New York, that exhibits Type 1 behavior in the source area and Type 3 behavior downgradient from the source. The most fortuitous scenario involves a plume in which PCE, TCE, and DCE are reductively dechlorinated with accumulation of VC near the source area (Type 1 or Type 2 behavior), then VC is oxidized (Type 3 behavior), either aerobically or via iron reduction further downgradient. Vinyl chloride is oxidized to carbon dioxide in this type of plume and does not accumulate. The following sequence of reactions occurs in a plume that exhibits this type of mixed behavior.



In general, TCE, DCE, and VC may attenuate at approximately the same rate, and thus these reactions may be confused with simple dilution. Note that no ethene is produced during this reaction. Vinyl chloride is removed from the system much faster under these conditions than it is under VC-reducing conditions.

A less desirable scenario, but one in which all contaminants may be entirely biodegraded, involves a plume in which all chlorinated aliphatic hydrocarbons are reductively dechlorinated via Type 1 or Type 2 behavior. Vinyl chloride is reduced to ethene, which may be further reduced to ethane or methane. The following sequence of reactions occurs in this type of plume.



This sequence has been investigated by Freedman and Gossett (1989). In this type of plume, VC degrades more slowly than TCE, and thus tends to accumulate.

2.2.2 Bioattenuation Screening Process

An accurate assessment of the potential for natural biodegradation of chlorinated compounds should be made before investing in a detailed study of natural attenuation. The screening process presented in this section is outlined in Figure 2.3. This approach should allow the investigator to determine if natural bioattenuation of PCE, TCE, DCE, TCA, and chlorobenzenes is likely to be a viable remedial alternative before additional time and money are expended. If the site is regulated under CERCLA, much of the data required to make the preliminary assessment of natural attenuation will be used to evaluate alternative engineered remedial solutions as required by the NCP. Table 2.3 presents the analytical screening criteria.

For most of the chlorinated solvents, the initial biotransformation in the environment is a reductive dechlorination. The initial screening process is designed to recognize geochemical environments where reductive dechlorination is plausible. It is recognized, however, that biodegradation of certain halogenated compounds can also proceed via oxidative pathways. Examples include DCE, VC, the dichloroethanes, chloroethane, dichlorobenzenes, monochlorobenzene, methylene chloride, and ethylene dibromide.

The following information is required for the screening process:

- The chemical and geochemical data presented in Table 2.3 for background and target areas of the plume as depicted in Figure 2.4. Figure 2.4 shows the schematic locations of these data collection points. Note: If other contaminants are suspected, then data on the concentrations and distribution of these compounds also should be obtained.
- Locations of source(s) and potential points of exposure. If subsurface NAPLs are sources, estimate extent of residual and free-phase NAPL.
- An estimate of the transport velocity and direction of ground-water flow.

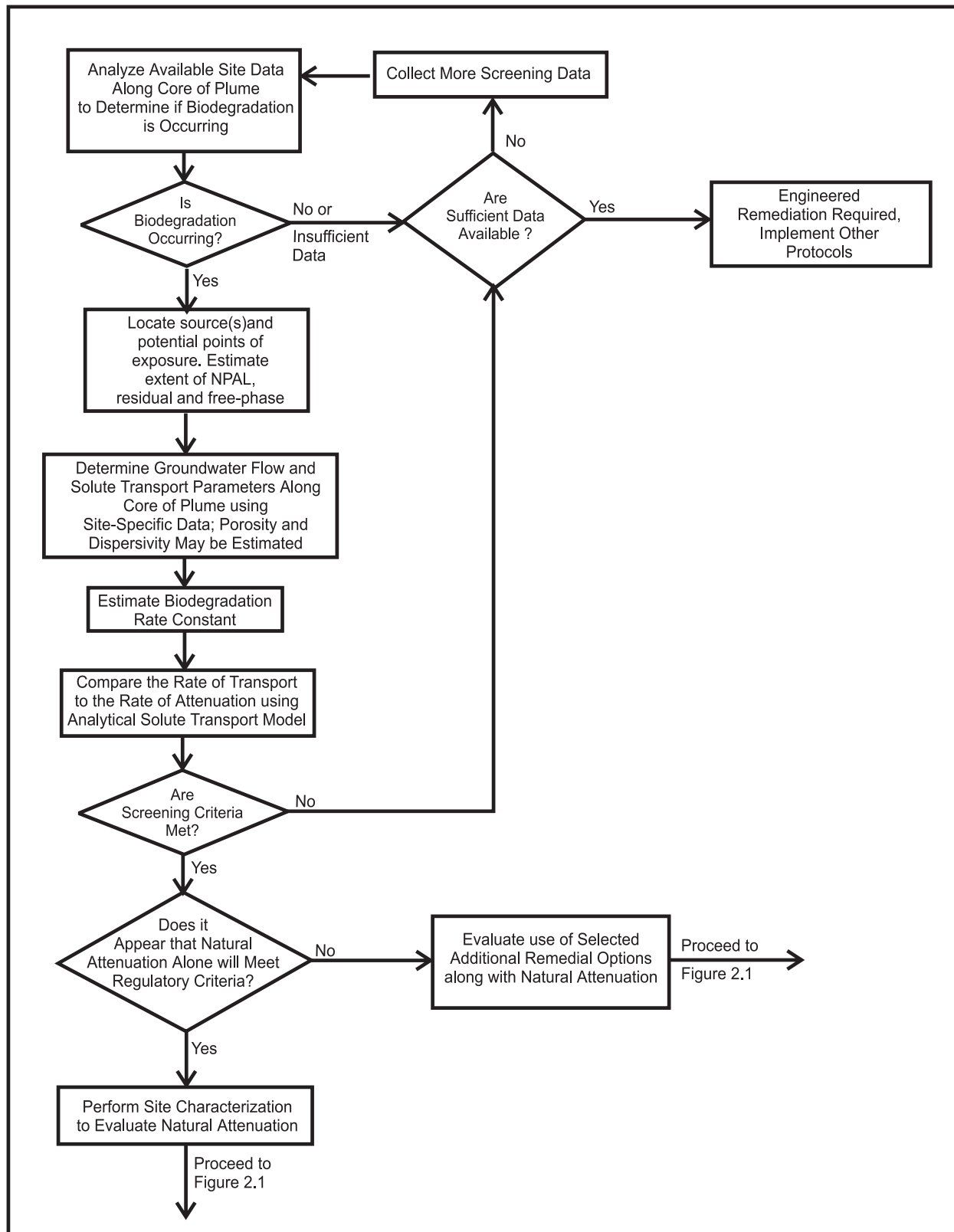


Figure 2.3 Initial screening process flow chart.

Table 2.3 Analytical Parameters and Weighting for Preliminary Screening for Anaerobic Biodegradation Processes^{a/}

Analysis	Concentration in Most Contaminated Zone	Interpretation	Value
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at higher concentrations	3
Oxygen*	>5 mg/L	Not tolerated; however, VC may be oxidized aerobically	-3
Nitrate*	<1 mg/L	At higher concentrations may compete with reductive pathway	2
Iron II*	>1 mg/L	Reductive pathway possible; VC may be oxidized under Fe(III)-reducing conditions	3
Sulfate*	<20 mg/L	At higher concentrations may compete with reductive pathway	2
Sulfide*	>1 mg/L	Reductive pathway possible	3
Methane*	<0.5 mg/L	VC oxidizes	0
	>0.5 mg/L	Ultimate reductive daughter product, VC Accumulates	3
Oxidation Reduction Potential* (ORP) against Ag/AgCl electrode	<50 millivolts (mV) <-100mV	Reductive pathway possible	1
		Reductive pathway likely	2
pH*	5 < pH < 9	Optimal range for reductive pathway	0
	5 > pH >9	Outside optimal range for reductive pathway	-2
TOC	> 20 mg/L	Carbon and energy source; drives dechlorination; can be natural or anthropogenic	2
Temperature*	> 20°C	At T >20°C biochemical process is accelerated	1
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1
Alkalinity	>2x background	Results from interaction between CO ₂ and aquifer minerals	1
Chloride*	>2x background	Daughter product of organic chlorine	2
Hydrogen	>1 nM	Reductive pathway possible, VC may accumulate	3
Hydrogen	<1 nM	VC oxidized	0
Volatile Fatty Acids	> 0.1 mg/L	Intermediates resulting from biodegradation of more complex compounds; carbon and energy source	2
BTEX*	> 0.1 mg/L	Carbon and energy source; drives dechlorination	2
Tetrachloroethene		Material released	0
Trichloroethene*		Material released	0
		Daughter product of PCE	2 ^{a/}
DCE*		Material released	0
		Daughter product of TCE	2 ^{a/}
		If cis is > 80% of total DCE it is likely a daughter product	
		1,1-DCE can be chemical reaction product of TCA	
VC*		Material released	0
		Daughter product of DCE	2 ^{a/}
1,1,1-Trichloroethane*		Material released	0
DCA		Daughter product of TCA under reducing conditions	2
Carbon Tetrachloride		Material released	0
Chloroethane*		Daughter product of DCA or VC under reducing conditions	2
Ethene/Ethane	>0.01mg/L	Daughter product of VC/ethene	2
	>0.1 mg/L		3
Chloroform		Material released	0
		Daughter product of Carbon Tetrachloride	2
Dichloromethane		Material released	0
		Daughter product of Chloroform	2

* Required analysis. a/ Points awarded only if it can be shown that the compound is a daughter product (i.e., not a constituent of the source NAPL).

Once these data have been collected, the screening process can be undertaken. The following steps summarize the screening processes:

- 1) Determine if biodegradation is occurring using geochemical data. If biodegradation is occurring, proceed to step 2. If it is not, assess the amount and types of data available. If data are insufficient to determine if biodegradation is occurring, collect supplemental data. If all the recommended screening parameters listed in section 2.2 have been collected and the screening processes suggest that natural attenuation is not appropriate, the screening processes are finished. Perform site characterization to evaluate other remediation alternatives.
- 2) Determine ground-water flow and solute transport parameters from representative field data. Dispersivity and porosity may be estimated from literature but the hydraulic conductivity and the ground-water gradient and flow direction must be determined from field data. The investigator should use the highest valid hydraulic conductivity measured at the site during the preliminary screening because solute plumes tend to follow the path of least resistance (i.e., highest hydraulic conductivity). This will give the “worst-case” estimate of the solute migration distance over a given period of time. Compare this “worst-case” estimate with the rate of plume migration determined from site characterization data. Determine what degree of plume migration is acceptable or unacceptable with respect to site-specific remediation objectives.
- 3) Locate source(s) and potential points of exposure. If subsurface NAPLs are sources, estimate extent of residual and free-phase NAPL.
- 4) Estimate the biodegradation rate constant. Biodegradation rate constants can be estimated using a conservative tracer found commingled with the contaminant plume, as described in Appendix C and by Wiedemeier *et al.* (1996b). When dealing with a plume that contains chlorinated solvents, this procedure can be modified to use chloride as a tracer. Rate constants derived from microcosm studies can also be used when site specific field data are inadequate or inconclusive. If it is not possible to estimate the biodegradation rate using these procedures, then use a range of accepted literature values for biodegradation of the contaminants of concern. Appendix C presents a range of biodegradation rate constants for various compounds. Although literature values may be used to estimate biodegradation rates in the bioattenuation screening process described in Section 2.2, literature values should not be used in the later more detailed analysis of natural attenuation, described in Section 2.3.
- 5) Compare the rate of transport to the rate of attenuation.
Use analytical solutions or a screening model such as BIOSCREEN.
- 6) Determine if screening criteria are met.

Step 1: Determine if Biodegradation is Occurring

The first step in the screening process is to sample or use existing data for the areas represented in Figure 2.4 and analyze them for the parameters listed in Table 2.3 (see also Section 2.3.2). These areas should include (1) the most contaminated portion of the aquifer (generally in the “source” area with NAPL or high concentrations of contaminants in ground water ; (2) downgradient from the source area but still in the dissolved contaminant plume; (3) downgradient from the dissolved contaminant plume; and (4) upgradient and lateral locations that are not impacted by the plume. Although this figure is a simplified two-dimensional representation of the features of a contaminant plume, real plumes are three-dimensional objects. The sampling should be conducted in accordance with Appendix A.

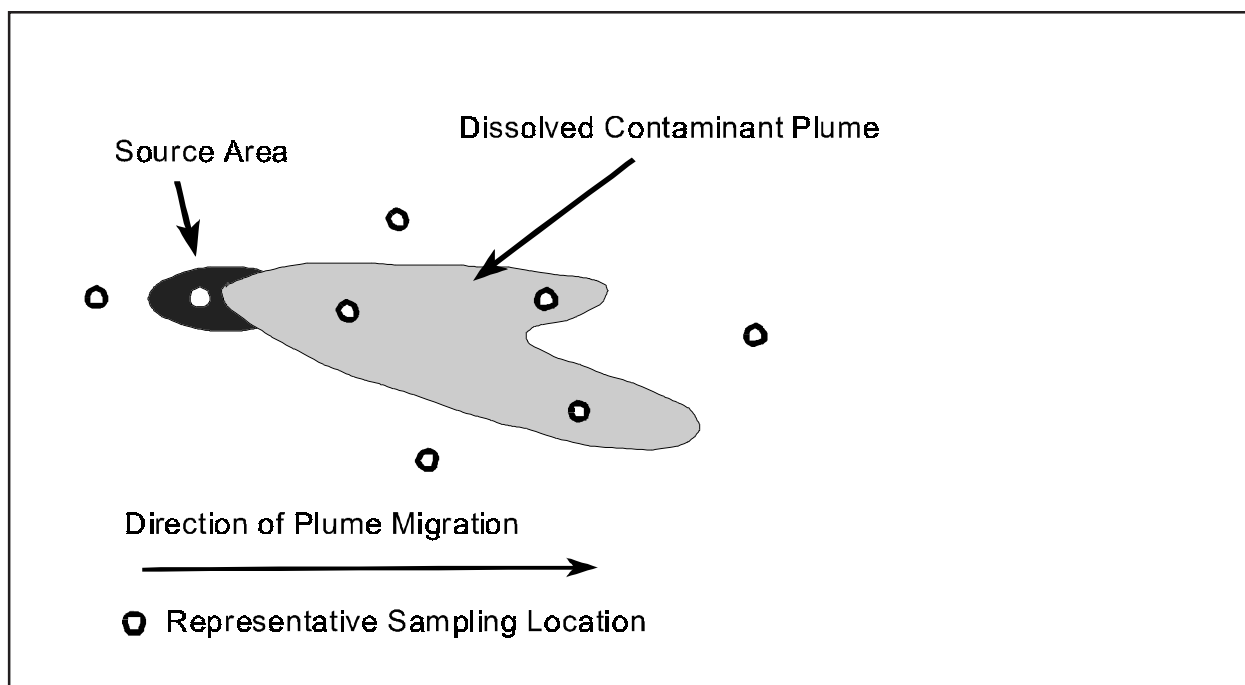


Figure 2.4 Target areas for collecting screening data. Note that the number and location of monitoring wells will vary with the three dimensional complexity of the plume(s).

The sample collected in the NAPL source area provides information as to the predominant terminal electron-accepting process at the source area. In conjunction with the sample collected in the NAPL source zone, samples collected in the dissolved plume downgradient from the NAPL source zone allow the investigator (1) to determine if the plume is degrading with distance along the flow path and (2) to determine the distribution of electron acceptors and donors and metabolic by-products along the flow path. The sample collected downgradient from the dissolved plume aids in plume delineation and allows the investigator to determine if metabolic byproducts are present in an area of ground water that has been remediated. The upgradient and lateral samples allow delineation of the plume and determination of background concentrations of the electron acceptors and donors.

After these samples have been analyzed for the parameters listed in Table 2.3, the investigator should analyze the data to determine if biodegradation is occurring. The right-hand column of Table 2.3 contains scoring values that can be used as a test to assess the likelihood that biodegradation is occurring. This method relies on the fact that biodegradation will cause predictable changes in ground water chemistry. For example, if the dissolved oxygen concentration in the area of the plume with the highest contaminant concentration is less than 0.5 milligrams per liter (mg/L), 3 points are awarded. Table 2.4 summarizes the range of possible scores and gives an interpretation for each score. If the score totals 15 or more points, it is likely that biodegradation is occurring, and the investigator should proceed to Step 2.

Table 2.4 Interpretation of Points Awarded During Screening Step 1

Score	Interpretation
0 to 5	Inadequate evidence for anaerobic biodegradation* of chlorinated organics
6 to 14	Limited evidence for anaerobic biodegradation* of chlorinated organics
15 to 20	Adequate evidence for anaerobic biodegradation* of chlorinated organics
> 20	Strong evidence for anaerobic biodegradation* of chlorinated organics
<i>*reductive dechlorination</i>	

The following two examples illustrate how Step 1 of the screening process is implemented. The site used in the first example is a former fire training area contaminated with chlorinated solvents mixed with fuel hydrocarbons. The presence of the fuel hydrocarbons appears to reduce the ORP of the ground water to the extent that reductive dechlorination is favorable. The second example contains data from a dry cleaning site contaminated only with chlorinated solvents. This site was contaminated with spent cleaning solvents that were dumped into a shallow dry well situated just above a well-oxygenated, unconfined aquifer with low organic carbon concentrations of dissolved organic carbon.

Example 1: Strong Evidence for Anaerobic Biodegradation (Reductive Dechlorination) of Chlorinated Organics

Analyte	Concentration in Most Contaminated Zone	Points Awarded
Dissolved Oxygen	0.1 mg/L	3
Nitrate	0.3 mg/L	2
Iron (II)	10 mg/L	3
Sulfate	2 mg/L	2
Methane	5 mg/L	3
ORP	-190 mV	2
Chloride	3 times background	2
PCE (released)	1,000 µg/L	0
TCE (none released)	1,200 µg/L	2
cis-DCE (none released)	500 µg/L	2
VC (none released)	50 µg/L	2
Total Points Awarded		23 Points

In this example, the investigator can infer that biodegradation is likely occurring at the time of sampling and may proceed to Step 2.

Example 2: Anaerobic Biodegradation (Reductive Dechlorination) Unlikely

Analyte	Concentration in Most Contaminated Zone	Points Awarded
Dissolved Oxygen	3 mg/L	-3
Nitrate	0.3 mg/L	2
Iron (II)	Not Detected (ND)	0
Sulfate	10 mg/L	2
Methane	ND	0
ORP	+ 100 mV	0
Chloride	background	0
TCE (released)	1,200 µg/L	0
cis-DCE (none released)	ND	0
VC (none released)	ND	0
Total Points Awarded		1 Point

In this example, the investigator can infer that biodegradation is probably not occurring or is occurring too slowly to contribute to natural attenuation at the time of the sampling. In this case, the investigator should evaluate whether other natural attenuation processes can meet the cleanup objectives for the site (e.g., abiotic degradation or transformation, volatilization or sorption) or select a remedial option other than MNA.

Step 2: Determine Ground-water Flow and Solute Transport Parameters

After it has been shown that biodegradation is occurring, it is important to quantify ground-water flow and solute transport parameters. This will make it possible to use a solute transport model to quantitatively estimate the concentration of the plume and its direction and rate of travel. To use an analytical model, it is necessary to know the hydraulic gradient and hydraulic conductivity for the site and to have estimates of porosity and dispersivity. It also is helpful to know the coefficient of retardation. Quantification of these parameters is discussed in detail in Appendix B.

In order to make the modeling as accurate as possible, the investigator must have site-specific hydraulic gradient and hydraulic conductivity data. To determine the ground-water flow and solute transport direction, it is necessary to have at least three accurately surveyed wells in each hydrogeologic unit of interest at the site. The porosity and dispersivity are generally estimated using accepted literature values for the aquifer matrix materials containing the plume at the site. If the investigator has total organic carbon data for soil, it is possible to estimate the coefficient of retardation; otherwise, it is conservative to assume that the solute transport and ground-water velocities are the same. Techniques to collect these data are discussed in the appendices.

Step 3: Locate Sources and Receptor Exposure Points

To determine the length of flow for the predictive modeling to be conducted in Step 5, it is important to know the distance between the source of contamination, the leading edge along the core of the dissolved plume, and any potential downgradient or cross-gradient receptor exposure points.

Step 4: Estimate the Biodegradation Rate

Biodegradation is the most important process that degrades contaminants in the subsurface; therefore, the biodegradation rate is one of the most important model input parameters. Biodegradation of chlorinated aliphatic hydrocarbons can be represented as a first-order rate constant. Whenever possible, use site-specific biodegradation rates estimated from field data collected along the core of the plume. Calculation of site-specific biodegradation rates is discussed in Appendix C. If it is not possible to determine site-specific biodegradation rates, then literature values may be used in a sensitivity analysis (Table C.3.5). A useful approach is to start with average values, and then to vary the model input to predict “best-case” and “worst-case” scenarios. Estimated biodegradation rates can be used only after it has been shown that biodegradation is occurring (see Step 1). Although literature values may be used to estimate biodegradation rates in the bioattenuation screening process described in Section 2.2, additional site information should be collected to determine biodegradation rates for the site when refining the site conceptual model, as described in Section 2.3. Literature values should not be used during the more detailed analysis.

Step 5: Compare the Rate of Transport to the Rate of Attenuation

At this early stage in the natural attenuation demonstration, comparison of the rate of solute transport to the rate of attenuation is best accomplished using an analytical model. Several models are available. It is suggested that the decay option be first order for use in any of the models.

The primary purpose of comparing the rate of transport to the rate of natural attenuation is to determine if natural attenuation processes will be capable of attaining site-specific remediation objectives in a time period that is reasonable compared to other alternatives (i.e., to quantitatively

Natural Attenuation Screening Protocol		Interpretation		Score		Score	
		Inadequate evidence for anaerobic biodegradation* of chlorinated solvents		0 to 5		2005 2	2006 5
		Limited evidence for anaerobic biodegradation* of chlorinated solvents		6 to 14			
MW3		Adequate evidence for anaerobic biodegradation* of chlorinated solvents		15 to 20		Inadequate	Inadequate
		Strong evidence for anaerobic biodegradation* of chlorinated solvents		>20			
Concentration in Most Contam. Zone				2005		2006	
Analysis			Yes	Data	Points	Data (d)	Points
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at high concentrations	3	6.41	0	2.5	0
	> 5mg/L	Not tolerated; however, VC may be oxidized aerobically	-3		-3		0
Nitrate*	<1 mg/L	At higher concentrations may compete with reductive pathway	2	2.6	0	1.7	0
Iron II* (ferrous-soluble)	>1 mg/L	Reductive pathway possible; VC may be oxidized to Fe(III)-reducing conditions	3	0.1U	0	0.15	0
Sulfate*	<20 mg/L	At higher concentrations may compete with reductive pathway	2	93.5	0	107	0
Sulfide*	>1 mg/L	Reductive pathway possible	3	1U	0	2U	0
Methane*	>0.5 mg/L	Ultimate reductive daughter product, VC Accumulates (<0.5 VC oxidizes)	3	0.005U	0	0.672	0
Oxidation Reduction Potential* (ORP)	<50 millivolts (mV)	Reductive pathway possible	1	41	1		1
	<-100mV	Reductive pathway likely	2		0	-101	2
pH*	5 < pH < 9 5>pH>9	Optimal range for reductive pathway Outside optimal range for reductive pathway	0 -2	6.97	0		0
TOC	>20 mg/L	Carbon and energy source; drives dechlorination; could be natural or anthropogenic	2	NS		NS	
Temperature*	>20°C	At T >20°C biochemical process is accelerated	1	14.27	0	15.05	0
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1	NS		NS	
Alkalinity ^(a)	>2x background 2005: 513 / 2006: 559	Results from interaction of carbon dioxide with aquifer minerals	1	398	0	408	0
Chloride* ^(b)	>2x background 2005: 78.2 / 2006: 130.9	Daughter product of organic chlorine	2	45.8	0	30.7	0
Hydrogen	>1 nM <1nM	Reductive pathway possible, VC may accumulate VC oxidized	3 0	NS		NS	
Volatile Fatty Acids	>0.1 mg/L	Intermediates resulting from biodegradation of aromatic compounds; carbon and energy source	2	NS		NS	
BTEX*	>0.1 mg/L (100 ug/L)	Carbon and energy source; drives dechlorination	2	ND	0	ND	0
PCE*		Material released	0	0.4U	0	0.28U	0
TCE*		Daughter product of PCE	2	0.6	0	0.48J	0
DCE* ^(c)		Daughter product of TCE. If cis is greater than 80% of total DCE it is likely a daughter product of TCE; 1,1-DCE can be a chem. reaction product of cis-1	2	trans - 0.3U DCE - 0.3U cis-1	2	0.38U 0.58U 0.64J	0
VC*		Daughter product of DCE	2	.4U	0	0.35U	0
1,1,1-Trichloroethane*		Material released	0	1.1	0	1.1	0
DCA		Daughter product of TCA under reducing conditions	2	2.9	2	2.3	2
Carbon Tetrachloride		Material released	0	0.3U	0	0.3U	0
Chloroethane*		Daughter product of DCA or VC under reducing conditions	2	0.4U	0	0.33U	0
Ethene/Ethane	>0.01 mg/L	Daughter product of VC/ethene	2	0.005U 0.005U	0	0.0001U 0.0001U	0
	>0.1 mg/L	Daughter product of VC/ethene	3		0		0
Chloroform		Daughter product of Carbon Tetrachloride	2	0.3U	0	0.19U	0
Dichloromethane		Daughter product of Chloroform	2	NS		NS	
Heterotroph Plate Count**		<500 CFU/ml is low range; 900-2000 CFU/ml is moderate; >10,000 CFU/ml is high		1245		215000	

Notes:

* required analysis according to EPA Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater

Background of alkalinity and chloride used from MW-47 (NE site edge location) and MW42 (NW corner of site)

**Not part of the EPA screening process. A measurement conducted for additional information.

(a) Alkalinity background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background alkalinity: (257mg/L (MW42) + 256 mg/L (MW47))/2 = 256.5 mg/L. Twice background is 513 mg/L.

2006 determination of background alkalinity: (2*((241+318)/2)) = 559 mg/L

(b) Chloride 2x background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background chloride (50.9 mg/L (MW42) + 27.3 mg/L (MW47))/2 = 39 mg/L. Twice background is 78.2 mg/L.

2006 determination of background chloride (2*((41.9+89)/2))=130.9 mg/L

(c) Data is listed in this order: trans-1,2-DCE, 1,1-DCE, cis-1,2-DCE

(d) See Table 3A for specific data results where non-detect (ND) is listed above.

Natural Attenuation Screening Protocol		Interpretation	Score	Score			
		Inadequate evidence for anaerobic biodegradation* of chlorinated	0 to 5	2005 12	limited	2006 12	limited
		Limited evidence for anaerobic biodegradation* of chlorinated	6 to 14				
MW4		Adequate evidence for anaerobic biodegradation* of chlorinated	15 to 20				
		Strong evidence for anaerobic biodegradation* of chlorinated	>20				
Concentration in Most Contam. Zone			Yes	2005		2006	
Analysis				Data	Points	Data (d)	Points
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at high concentrations	3	4.98	0	1.81	0
	> 5mg/L	Not tolerated; however, VC may be oxidized aerobically	-3				0
Nitrate*	<1 mg/L	At higher concentrations may compete with reductive pathway	2	0.11	2	0.38	2
Iron II* (ferrous-soluble)	>1 mg/L	Reductive pathway possible; VC may be oxidized to Fe(III)-reducing conditions	3	0.1U	0	0.1U	0
Sulfate*	<20 mg/L	At higher concentrations may compete with reductive pathway	2	70.8	0	69.4	0
Sulfide*	>1 mg/L	Reductive pathway possible	3	1U	0	1U	0
Methane*	>0.5 mg/L	Ultimate reductive daughter product, VC Accumulation (<0.5 VC oxidizes)	3	0.014	0	0.009	0
Oxidation Reduction Potential* (ORP)	<50 millivolts (mV)	Reductive pathway possible	1	29	1	49	1
	<-100mV	Reductive pathway likely	2		0		0
pH*	5 < pH < 9	Optimal range for reductive pathway	0	6.78	0	6.78	0
	5>pH>9	Outside optimal range for reductive pathway	-2				0
TOC	>20 mg/L	Carbon and energy source; drives dechlorination; of natural or anthropogenic	2	NS		NS	
Temperature*	>20°C	At T >20°C biochemical process is accelerated	1	15.04	0	16.12	0
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1	NS		NS	
Alkalinity ^(a)	>2x background 2005: 513 / 2006: 559	Results from interaction of carbon dioxide with aquifer minerals	1	769	1	809	1
Chloride* ^(b)	>2x background 2005: 78.2 / 2006: 130.9	Daughter product of organic chlorine	2	25.6	0	16.4	0
Hydrogen	>1 nM <1nM	Reductive pathway possible, VC may accumulate VC oxidized	3 0	NS		NS	
Volatile Fatty Acids	>0.1 mg/L	Intermediates resulting from biodegradation of aromatic compounds; carbon and energy source	2	NS		NS	
BTEX*	>0.1 mg/L (100 ug/L)	Carbon and energy source; drives dechlorination	2	ND	0	ND	0
PCE*		Material released	0	8.1	0	10.6	0
TCE*		Daughter product of PCE	2	21	2	17.3	2
DCE* ^(c)		Daughter product of TCE.	2	0.7	2	0.86J	2
		If cis is greater than 80% of total DCE it is likely a daughter product of TCE; 1,1-DCE can be a chem. reaction product of		0.6		0.78J	
				78		52.9	
VC*		Daughter product of DCE	2	39	2	25.2	2
1,1,1-Trichloroethane*		Material released	0	0.9	0	0.65J	0
DCA		Daughter product of TCA under reducing conditions	2	1.3	2	1.4	2
Carbon Tetrachloride		Material released	0	0.3U	0	0.3U	0
Chloroethane*		Daughter product of DCA or VC under reducing conditions	2	0.4U	0	0.33U	0
Ethene/Ethane	>0.01 mg/L	Daughter product of VC/ethene	2	0.005U 0.005U	0	0.00023 0.001U	0
	>0.1 mg/L	Daughter product of VC/ethene	3		0		0
Chloroform		Daughter product of Carbon Tetrachloride	2	0.3U	0	0.19U	0
Dichloromethane		Daughter product of Chloroform	2	NS		NS	
Heterotroph Plate Count**		<500 CFU/ml is low range; 900-2000 CFU/ml is moderate; >10,000 CFU/ml is high		237		1000U	

Notes:

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Background of alkalinity and chloride used from MW-47 (NE site edge location) and MW42 (NW corner of site)

**Not part of the EPA screening process. A measurement conducted for additional information.

(a) Alkalinity background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background alkalinity: (257mg/L (MW42) + 256 mg/L (MW47))/2 = 256.5 mg/L. Twice background is 513 mg/L.

2006 determination of background alkalinity: (2*((241+318)/2)) = 559 mg/L

(b) Chloride 2x background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background chloride (50.9 mg/L (MW42) + 27.3 mg/L (MW47))/2 = 39 mg/L. Twice background is 78.2 mg/L.

2006 determination of background chloride (2*((41.9+89)/2))=130.9 mg/L

(c) Data is listed in this order: trans-1,2-DCE, 1,1-DCE, cis-1,2-DCE

(d) See Table 3A for specific data results where non-detect (ND) is listed above.

Natural Attenuation Screening Protocol		Interpretation	Score	Score			
		Inadequate evidence for anaerobic biodegradation* of chlorinated	0 to 5	2005 4		2006 0	
		Limited evidence for anaerobic biodegradation* of chlorinated	6 to 14				
MW6		Adequate evidence for anaerobic biodegradation* of chlorinated	15 to 20	inadequate			
		Strong evidence for anaerobic biodegradation* of chlorinated	>20	inadequate			
Concentration in Most Contam. Zone			Yes	2005		2006	
Analysis				Data	Points	Data (d)	Points
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at high concentrations	3	6.41		6.42	
	> 5mg/L	Not tolerated; however, VC may be oxidized aerobically	-3		-3		-3
Nitrate*	<1 mg/L	At higher concentrations may compete with reductive pathway	2	0.97U	2	1.6	0
Iron II* (ferrous-soluble)	>1 mg/L	Reductive pathway possible; VC may be oxidized to Fe(III)-reducing conditions	3	0.1U	0	0.2U	0
Sulfate*	<20 mg/L	At higher concentrations may compete with reductive pathway	2	178	0	469	0
Sulfide*	>1 mg/L	Reductive pathway possible	3	1U	0	2U	0
Methane*	>0.5 mg/L	Ultimate reductive daughter product, VC Accumulation (<0.5 VC oxidizes)	3	0.005U	0	0.0001U	0
Oxidation Reduction Potential* (ORP)	<50 millivolts (mV)	Reductive pathway possible	1	41	1	45	1
	<-100mV	Reductive pathway likely	2		0		0
pH*	5 < pH < 9	Optimal range for reductive pathway	0	6.97	0	7.16	0
	5>pH>9	Outside optimal range for reductive pathway	-2				
TOC	>20 mg/L	Carbon and energy source; drives dechlorination; of natural or anthropogenic	2	NS		NS	
Temperature*	>20°C	At T >20°C biochemical process is accelerated	1	14.27	0	13.69	0
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1	NS		NS	
Alkalinity ^(a)	>2x background 2005: 513 / 2006: 559	Results from interaction of carbon dioxide with aquifer minerals	1	236	0	292	0
Chloride* ^(b)	>2x background 2005: 78.2 / 2006: 130.9	Daughter product of organic chlorine	2	5U	0	11.3	0
Hydrogen	>1 nM	Reductive pathway possible, VC may accumulate	3	NS		NS	
	<1nM	VC oxidized	0				
Volatile Fatty Acids	>0.1 mg/L	Intermediates resulting from biodegradation of aromatic compounds; carbon and energy source	2	NS		NS	
BTEX*	>0.1 mg/L (100 ug/L)	Carbon and energy source; drives dechlorination	2	ND	0	ND	0
PCE*		Material released	0	1	0	0.28U	0
TCE*		Daughter product of PCE	2	6.2	2	1.3	0
DCE* ^(c)		Daughter product of TCE.	2	0.3U	0	0.38U	0
		If cis is greater than 80% of total DCE it is likely a daughter product of TCE; 1,1-DCE can be a chem. reaction product of		4.4		1.5	
				0.4U		0.56U	
VC*		Daughter product of DCE	2	0.4U	0	0.35U	0
1,1,1-Trichloroethane*		Material released	0	46	0	6.3	0
DCA		Daughter product of TCA under reducing conditions	2	12	2	2.2	2
Carbon Tetrachloride		Material released	0	0.3U	0	0.3U	0
Chloroethane*		Daughter product of DCA or VC under reducing conditions	2	0.4U	0	0.33U	0
Ethene/Ethane	>0.01 mg/L	Daughter product of VC/ethene	2	0.005U 0.005U	0	0.0001U 0.0001U	0
	>0.1 mg/L	Daughter product of VC/ethene	3		0		0
Chloroform		Daughter product of Carbon Tetrachloride	2	0.3U	0	0.19U	0
Dichloromethane		Daughter product of Chloroform	2	NS	0	NS	
Heterotroph Plate Count**		<500 CFU/ml is low range; 900-2000 CFU/ml is moderate; >10,000 CFU/ml is high		145		550	

Notes:

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Background of alkalinity and chloride used from MW-47 (NE site edge location) and MW42 (NW corner of site)

**Not part of the EPA screening process. A measurement conducted for additional information.

(a) Alkalinity background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background alkalinity: (257mg/L (MW42) + 256 mg/L (MW47))/2 = 256.5 mg/L. Twice background is 513 mg/L.

2006 determination of background alkalinity: (2*(241+318))/2 = 559 mg/L

(b) Chloride 2x background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background chloride (50.9 mg/L (MW42) + 27.3 mg/L (MW47))/2 = 39 mg/L. Twice background is 78.2 mg/L.

2006 determination of background chloride (2*((41.9+89)/2))=130.9 mg/L

(c) Data is listed in this order: trans-1,2-DCE, 1,1-DCE, cis-1,2-DCE

(d) See Table 3A for specific data results where non-detect (ND) is listed above.

Natural Attenuation Screening Protocol MW12		Interpretation	Score	Score				
		Inadequate evidence for anaerobic biodegradation* of chlorinated	0 to 5	2005		2006		
		Limited evidence for anaerobic biodegradation* of chlorinated	6 to 14	0		5		
		Adequate evidence for anaerobic biodegradation* of chlorinated	15 to 20	inadequate		inadequate		
		Strong evidence for anaerobic biodegradation* of chlorinated	>20					
Concentration in Most Contam. Zone			Yes	2005		2006		
Analysis				Data	Points	Data (d)	Points	
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at high concentrations	3	5.63	0	3.12	0	
	> 5mg/L	Not tolerated; however, VC may be oxidized aerobically	-3		-3		0	
Nitrate*	<1 mg/L	At higher concentrations may compete with reductive pathway	2	0.58	2	0.28	2	
Iron II* (ferrous-soluble)	>1 mg/L	Reductive pathway possible; VC may be oxidized to Fe(III)-reducing conditions	3	0.21	0	.2U	0	
Sulfate*	<20 mg/L	At higher concentrations may compete with reductive pathway	2	22.1	0	21.3	0	
Sulfide*	>1 mg/L	Reductive pathway possible	3	1U	0	2U	0	
Methane*	>0.5 mg/L	Ultimate reductive daughter product, VC Accumulation (<0.5 VC oxidizes)	3	0.044	0	0.0101	0	
Oxidation Reduction Potential* (ORP)	<50 millivolts (mV)	Reductive pathway possible	1	-97	1	-143	1	
	<-100mV	Reductive pathway likely	2		0		2	
pH*	5 < pH < 9	Optimal range for reductive pathway	0	7.19	0	7.29	0	
	5>pH>9	Outside optimal range for reductive pathway	-2					
TOC	>20 mg/L	Carbon and energy source; drives dechlorination; natural or anthropogenic	2	NS		NS		
Temperature*	>20°C	At T >20°C biochemical process is accelerated	1	14.55	0	14.23	0	
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1	NS		NS		
Alkalinity ^(a)	>2x background 2005: 513 / 2006: 559	Results from interaction of carbon dioxide with aquifer minerals	1	333	0	278	0	
Chloride* ^(b)	>2x background 2005: 78.2 / 2006: 130.9	Daughter product of organic chlorine	2	50.6	0	39.2	0	
Hydrogen	>1 nM	Reductive pathway possible, VC may accumulate	3	NS		NS		
	<1nM	VC oxidized	0					
Volatile Fatty Acids	>0.1 mg/L	Intermediates resulting from biodegradation of aromatic compounds; carbon and energy source	2	NS		NS		
BTEX*	>0.1 mg/L (100 ug/L)	Carbon and energy source; drives dechlorination	2	ND	0	ND	0	
PCE*		Material released	0	0.4U	0	0.44J	0	
TCE*		Daughter product of PCE	2	0.4U	0	0.2U	0	
DCE* ^(c)		Daughter product of TCE.	2	0.3U	0	0.38U	0	
		If cis is greater than 80% of total DCE it is likely a daughter product of TCE; 1,1-DCE can be a chem. reaction product of	0.3U			0.58U		
			0.4U			0.56U		
VC*		Daughter product of DCE	2	0.4U	0	0.35U	0	
1,1,1-Trichloroethane*		Material released	0	0.3U	0	0.24U	0	
DCA		Daughter product of TCA under reducing conditions	2	0.4U	0	0.7U	0	
Carbon Tetrachloride		Material released	0	0.3U	0	1U	0	
Chloroethane*		Daughter product of DCA or VC under reducing conditions	2	0.4U	0	1U	0	
Ethene/Ethane	>0.01 mg/L	Daughter product of VC/ethene	2	0.005U 0.005U	0	0.0001U 0.0001U	0	
	>0.1 mg/L	Daughter product of VC/ethene	3		0		0	
Chloroform		Daughter product of Carbon Tetrachloride	2	0.3U	0	0.3U	0	
Dichloromethane		Daughter product of Chloroform	2	NS	0	NS		
Heterotroph Plate Count**		<500 CFU/ml is low range; 900-2000 CFU/ml is moderate; >10,000 CFU/ml is high		62U		300		

Notes:

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Background of alkalinity and chloride used from MW-47 (NE site edge location) and MW42 (NW corner of site)

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(b) Chloride 2x background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background chloride (50.9 mg/L (MW42) + 27.3 mg/L (MW47))/2 = 39 mg/L. Twice background is 78.2 mg/L.

2006 determination of background chloride (2*((41.9+89)/2))=130.9 mg/L

(c) Data is listed in this order: trans-1,2-DCE, 1,1-DCE, cis-1,2-DCE

(d) See Table 3A for specific data results where non-detect (ND) is listed above.

Natural Attenuation Screening Protocol		Interpretation	Score	Score			
		Inadequate evidence for anaerobic biodegradation* of chlorinated	0 to 5	2005 5		2006 5	
		Limited evidence for anaerobic biodegradation* of chlorinated	6 to 14				
MW16		Adequate evidence for anaerobic biodegradation* of chlorinated	15 to 20	inadequate		inadequate	
		Strong evidence for anaerobic biodegradation* of chlorinated	>20				
Concentration in Most Contam. Zone			2005		2006		
Analysis			Yes	Data	Points	Data (d)	Points
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at high concentrations	3	5.37	0	3.43	0
	> 5mg/L	Not tolerated; however, VC may be oxidized aerobically	-3		-3		0
Nitrate*	<1 mg/L	At higher concentrations may compete with reductive pathway	2	0.61	2	0.74	2
Iron II* (ferrous-soluble)	>1 mg/L	Reductive pathway possible; VC may be oxidized to Fe(III)-reducing conditions	3	0.1U	0	0.2U	0
Sulfate*	<20 mg/L	At higher concentrations may compete with reductive pathway	2	48.4	0	58.9	0
Sulfide*	>1 mg/L	Reductive pathway possible	3	1U	0	2U	0
Methane*	>0.5 mg/L	Ultimate reductive daughter product, VC Accumulation (<0.5 VC oxidizes)	3	0.005U	0	0.0001U	0
Oxidation Reduction Potential* (ORP)	<50 millivolts (mV)	Reductive pathway possible	1	61	0	-10	1
	<-100mV	Reductive pathway likely	2		0		0
pH*	5 < pH < 9	Optimal range for reductive pathway	0	7.48	0	7.29	0
	5>pH>9	Outside optimal range for reductive pathway	-2				
TOC	>20 mg/L	Carbon and energy source; drives dechlorination; of natural or anthropogenic	2	NS		NS	
Temperature*	>20°C	At T >20°C biochemical process is accelerated	1	16.11	0	17	0
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1	NS		NS	
Alkalinity ^(a)	>2x background 2005: 513 / 2006: 559	Results from interaction of carbon dioxide with aquifer minerals	1	269	0	302	0
Chloride* ^(b)	>2x background 2005: 78.2 / 2006: 130.9	Daughter product of organic chlorine	2	54.6	0	73.4	0
Hydrogen	>1 nM	Reductive pathway possible, VC may accumulate	3	NS		NS	
	<1nM	VC oxidized	0				
Volatile Fatty Acids	>0.1 mg/L	Intermediates resulting from biodegradation of aromatic compounds; carbon and energy source	2	NS		NS	
BTEX*	>0.1 mg/L (100 ug/L)	Carbon and energy source; drives dechlorination	2	ND	0	ND	0
PCE*		Material released	0	6.7	0	0.66J	0
TCE*		Daughter product of PCE	2	2.8	2	0.34J	0
DCE* ^(c)		Daughter product of TCE.	2	0.3U	2	0.38U	0
		If cis is greater than 80% of total DCE it is likely a daughter product of TCE; 1,1-DCE can be a chem. reaction product of	3.8			4.9	
			1.5			0.56U	
VC*		Daughter product of DCE	2	0.4U	0	0.35U	0
1,1,1-Trichloroethane*		Material released	0	11	0	12.6	0
DCA		Daughter product of TCA under reducing conditions	2	4.5	2	5.2	2
Carbon Tetrachloride		Material released	0	0.3U	0	0.3U	0
Chloroethane*		Daughter product of DCA or VC under reducing conditions	2	0.4U	0	0.33U	0
Ethene/Ethane	>0.01 mg/L	Daughter product of VC/ethene	2	0.005U 0.005U	0	0.0001U 0.0001U	0
	>0.1 mg/L	Daughter product of VC/ethene	3		0		0
Chloroform		Daughter product of Carbon Tetrachloride	2	0.3U	0	0.19U	0
Dichloromethane		Daughter product of Chloroform	2	NS		NS	
Heterotroph Plate Count**		<500 CFU/ml is low range; 900-2000 CFU/ml is moderate; >10,000 CFU/ml is high		540U		5500	

Notes:

* required analysis according to EPA Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater

Background of alkalinity and chloride used from MW-47 (NE site edge location) and MW42 (NW corner of site)

**Not part of the EPA screening process. A measurement conducted for additional information.

(a) Alkalinity background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background alkalinity: (257mg/L (MW42) + 256 mg/L (MW47))/2 = 256.5 mg/L. Twice background is 513 mg/L.

2006 determination of background alkalinity: (2*((241+318)/2)) = 559 mg/L

(b) Chloride 2xbackground calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background chloride (50.9 mg/L (MW42) + 27.3 mg/L (MW47))/2 = 39 mg/L. Twice background is 78.2 mg/L.

2006 determination of background chloride (2*((41.9+89)/2))=130.9 mg/L

(c) Data is listed in this order: trans-1,2-DCE, 1,1-DCE, cis-1,2-DCE

(d) See Table 3A for specific data results where non-detect (ND) is listed above.

Natural Attenuation Screening Protocol		Interpretation	Score	Score			
		Inadequate evidence for anaerobic biodegradation* of chlorinated	0 to 5	2005 0	inadequate	2006 -3	inadequate
		Limited evidence for anaerobic biodegradation* of chlorinated	6 to 14				
MW18		Adequate evidence for anaerobic biodegradation* of chlorinated	15 to 20				
		Strong evidence for anaerobic biodegradation* of chlorinated	>20				
Concentration in Most Contam. Zone			2005		2006		
Analysis			Yes	Data	Points	Data (d)	Points
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at high concentrations	3	5.03	0	5.36	0
	> 5mg/L	Not tolerated; however, VC may be oxidized aerobically	-3		-3		-3
Nitrate*	<1 mg/L	At higher concentrations may compete with reductive pathway	2	3.2	0	7.8	0
Iron II* (ferrous-soluble)	>1 mg/L	Reductive pathway possible; VC may be oxidized to Fe(III)-reducing conditions	3	0.1	0	0.1U	0
Sulfate*	<20 mg/L	At higher concentrations may compete with reductive pathway	2	19.1	2	29.7	0
Sulfide*	>1 mg/L	Reductive pathway possible	3	1U	0	2U	0
Methane*	>0.5 mg/L	Ultimate reductive daughter product, VC Accumulation (<0.5 VC oxidizes)	3	0.0092	0	0.0001U	0
Oxidation Reduction Potential* (ORP)	<50 millivolts (mV)	Reductive pathway possible	1	26	1	90	0
	<-100mV	Reductive pathway likely	2		0		0
pH*	5 < pH < 9	Optimal range for reductive pathway	0	7.15	0	7.19	0
	5>pH>9	Outside optimal range for reductive pathway	-2				
TOC	>20 mg/L	Carbon and energy source; drives dechlorination; could be natural or anthropogenic	2	NS		NS	
Temperature*	>20°C	At T >20°C biochemical process is accelerated	1	14.04	0	15.36	0
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1	NS		NS	
Alkalinity ^(a)	>2x background 2005: 513 / 2006: 559	Results from interaction of carbon dioxide with aquifer minerals	1	294	0	234	0
Chloride* ^(b)	>2x background 2005: 78.2 / 2006: 130.9	Daughter product of organic chlorine	2	8.9	0	6.6	0
Hydrogen	>1 nM <1nM	Reductive pathway possible, VC may accumulate VC oxidized	3 0	NS		NS	
Volatile Fatty Acids	>0.1 mg/L	Intermediates resulting from biodegradation of aromatic compounds; carbon and energy source	2	NS		NS	
BTEX*	>0.1 mg/L (100 ug/L)	Carbon and energy source; drives dechlorination	2	ND	0	ND	0
PCE*		Material released	0	0.4U	0	0.28U	0
TCE*		Daughter product of PCE	2	0.4U	0	0.2U	0
DCE* ^(c)		Daughter product of TCE.	2	0.3U	0	0.38U	0
		If cis is greater than 80% of total DCE it is likely a daughter product of TCE; 1,1-DCE can be a chem. reaction product of TCE		0.3U		0.58U	
				0.4U		0.56U	
VC*		Daughter product of DCE	2	0.4U	0	0.35U	0
1,1,1-Trichloroethane*		Material released	0	0.3U	0	0.24U	0
DCA		Daughter product of TCA under reducing conditions	2	0.4U	0	0.7U	0
Carbon Tetrachloride		Material released	0	0.3U	0	0.3U	0
Chloroethane*		Daughter product of DCA or VC under reducing conditions	2	0.4U	0	0.33U	0
Ethene/Ethane	>0.01 mg/L	Daughter product of VC/ethene	2	0.005U 0.005U	0	0.0001U 0.0001U	0
	>0.1 mg/L	Daughter product of VC/ethene	3		0		0
Chloroform		Daughter product of Carbon Tetrachloride	2	0.3U	0	0.19U	0
Dichloromethane		Daughter product of Chloroform	2	NS		NS	
Heterotroph Plate Count**		<500 CFU/ml is low range; 900-2000 CFU/ml is moderate; >10,000 CFU/ml is high		380		350	

Notes:

* required analysis according to EPA Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater

Background of alkalinity and chloride used from MW-47 (NE site edge location) and MW42 (NW corner of site)

**Not part of the EPA screening process. A measurement conducted for additional information.

(a) Alkalinity background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background alkalinity: (257mg/L (MW42) + 256 mg/L (MW47))/2 = 256.5 mg/L. Twice background is 513 mg/L.

2006 determination of background alkalinity: (2*((241+318)/2)) = 559 mg/L

(b) Chloride 2x background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background chloride (50.9 mg/L (MW42) + 27.3 mg/L (MW47))/2 = 39 mg/L. Twice background is 78.2 mg/L.

2006 determination of background chloride (2*((41.9+89)/2))=130.9 mg/L

(c) Data is listed in this order: trans-1,2-DCE, 1,1-DCE, cis-1,2-DCE

(d) See Table 3A for specific data results where non-detect (ND) is listed above.

Natural Attenuation Screening Protocol		Interpretation	Score	Score			
		Inadequate evidence for anaerobic biodegradation* of chlorinated solvents	0 to 5	2005 4		2006 10	
		Limited evidence for anaerobic biodegradation* of chlorinated solvents	6 to 14				
MW20		Adequate evidence for anaerobic biodegradation* of chlorinated solvents	15 to 20	inadequate		limited	
		Strong evidence for anaerobic biodegradation* of chlorinated solvents	>20				
Concentration in Most Contam. Zone			Yes	2005		2006	
Analysis				Data	Points	Data (d)	Points
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at high concentrations	3	5.05	0	2.49	0
	> 5mg/L	Not tolerated; however, VC may be oxidized aerobically	-3		-3		0
Nitrate*	<1 mg/L	At higher concentrations may compete with reductive pathway	2	0.8U	2	0.14	2
Iron II* (ferrous-soluble)	>1 mg/L	Reductive pathway possible; VC may be oxidized to Fe(III)-reducing conditions	3	0.39	0	0.2U	0
Sulfate*	<20 mg/L	At higher concentrations may compete with reductive pathway	2	10.2	2	11.3	2
Sulfide*	>1 mg/L	Reductive pathway possible	3	1U	0	2U	0
Methane*	>0.5 mg/L	Ultimate reductive daughter product, VC Accumulates (<0.5 VC oxidizes)	3	0.42	0	0.767	3
Oxidation Reduction Potential* (ORP)	<50 millivolts (mV)	Reductive pathway possible	1	-175	1	-187	1
	<-100mV	Reductive pathway likely	2		2		2
pH*	5 < pH < 9 5>pH>9	Optimal range for reductive pathway Outside optimal range for reductive pathway	0 -2	7.13	0	7.18	0
TOC	>20 mg/L	Carbon and energy source; drives dechlorination; of natural or anthropogenic	2	NS		NS	
Temperature*	>20°C	At T >20°C biochemical process is accelerated	1	12.72	0	13.34	0
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1	NS		NS	
Alkalinity ^(a)	>2x background 2005: 513 / 2006: 559	Results from interaction of carbon dioxide with aquifer minerals	1	357	0	324	0
Chloride* ^(b)	>2x background 2005: 78.2 / 2006: 130.9	Daughter product of organic chlorine	2	13.1	0	12.7	0
Hydrogen	>1 nM <1nM	Reductive pathway possible; VC may accumulate VC oxidized	3 0	NS		NS	
Volatile Fatty Acids	>0.1 mg/L	Intermediates resulting from biodegradation of aromatic compounds; carbon and energy source	2	NS		NS	
BTEX*	>0.1 mg/L (100 ug/L)	Carbon and energy source; drives dechlorination	2	ND	0	ND	0
PCE*		Material released	0	0.4U	0	0.28U	0
TCE*		Daughter product of PCE	2	0.4U	0	0.2U	0
DCE* ^(c)		Daughter product of TCE. If cis is greater than 80% of total DCE it is likely a daughter product of TCE; 1,1-DCE can be a chem. reaction product of DCE	2	0.3U 0.3U 0.4U	0	0.38U 0.58U 0.56U	0
	VC*	Daughter product of DCE	2	0.4U	0	0.35U	0
	1,1,1-Trichloroethane*		Material released	0	0.3U	0	0.24U
DCA		Daughter product of TCA under reducing conditions	2	0.4U	0	0.7U	0
Carbon Tetrachloride		Material released	0	0.3U	0	0.3U	0
Chloroethane*		Daughter product of DCA or VC under reducing conditions	2	0.4U	0	0.33U	0
Ethene/Ethane	>0.01 mg/L	Daughter product of VC/ethene	2	0.025U 0.025U	0	0.0001U 0.0001U	0
	>0.1 mg/L	Daughter product of VC/ethene	3		0		0
Chloroform		Daughter product of Carbon Tetrachloride	2	0.3U	0	0.19U	0
Dichloromethane		Daughter product of Chloroform	2	NS		NS	
Heterotroph Plate Count**				34U		100	

Notes:

* required analysis according to EPA Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater
Background of alkalinity and chloride used from MW-47 (NE site edge location) and MW42 (NW corner of site)

**Not part of the EPA screening process. A measurement conducted for additional information.

(a) Alkalinity background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background alkalinity: (257mg/L (MW42) + 256 mg/L (MW47))/2 = 256.5 mg/L. Twice background is 513 mg/L.

2006 determination of background alkalinity: (2*((241+318)/2)) = 559 mg/L

(b) Chloride 2xbackground calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background chloride (50.9 mg/L (MW42) + 27.3 mg/L (MW47))/2 = 39 mg/L. Twice background is 78.2 mg/L.

2006 determination of background chloride (2*((41.9+89)/2))=130.9 mg/L

(c) Data is listed in this order: trans-1,2-DCE, 1,1-DCE, cis-1,2-DCE

(d) See Table 3A for specific data results where non-detect (ND) is listed above.

Natural Attenuation Screening Protocol		Interpretation	Score	Score			
		Inadequate evidence for anaerobic biodegradation* of chlorinated	0 to 5	2005		2006	
MW30		Limited evidence for anaerobic biodegradation* of chlorinated	6 to 14	-1		-1	
		Adequate evidence for anaerobic biodegradation* of chlorinated	15 to 20	inadequate		inadequate	
		Strong evidence for anaerobic biodegradation* of chlorinated	>20				
Concentration in Most Contam. Zone			Yes	2005 Data	2005 Points	2006 Data (d)	2006 Points
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at high concentrations	3	6.84	0	9.61	0
	> 5mg/L	Not tolerated; however, VC may be oxidized aerobically	-3		-3		-3
Nitrate*	<1 mg/L	At higher concentrations may compete with reductive pathway	2	0.14U	2	0.11U	2
Iron II* (ferrous-soluble)	>1 mg/L	Reductive pathway possible; VC may be oxidized to Fe(III)-reducing conditions	3	0.1U	0	0.2U	0
Sulfate*	<20 mg/L	At higher concentrations may compete with reductive pathway	2	35.9	0	39.6	0
Sulfide*	>1 mg/L	Reductive pathway possible	3	0.1U	0	2U	0
Methane*	>0.5 mg/L	Ultimate reductive daughter product, VC Accumulation (<0.5 VC oxidizes)	3	0.005U	0	0.0001U	0
Oxidation Reduction Potential* (ORP)	<50 millivolts (mV)	Reductive pathway possible	1	102	0	59	0
	<-100mV	Reductive pathway likely	2		0		0
pH*	5 < pH < 9	Optimal range for reductive pathway	0	7.3	0	6.98	0
	5>pH>9	Outside optimal range for reductive pathway	-2				
TOC	>20 mg/L	Carbon and energy source; drives dechlorination; of natural or anthropogenic	2	NS		NS	
Temperature*	>20°C	At T >20°C biochemical process is accelerated	1	13.95	0	13.35	0
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1	NS		NS	
Alkalinity ^(a)	>2x background 2005: 513 / 2006: 559	Results from interaction of carbon dioxide with aquifer minerals	1	197	0	155	0
Chloride ^(b)	>2x background 2005: 78.2 / 2006: 130.9	Daughter product of organic chlorine	2	20	0	59.4	0
Hydrogen	>1 nM	Reductive pathway possible, VC may accumulate	3	NS		NS	
	<1nM	VC oxidized	0				
Volatile Fatty Acids	>0.1 mg/L	Intermediates resulting from biodegradation of aromatic compounds; carbon and energy source	2	NS		NS	
BTEX*	>0.1 mg/L (100 ug/L)	Carbon and energy source; drives dechlorination	2	ND	0	ND	0
PCE*		Material released	0	0.4U	0	0.28U	0
TCE*		Daughter product of PCE	2	0.4U	0	0.2U	0
DCE* ^(c)		Daughter product of TCE.	2	0.3U	0	0.38U	0
		If cis is greater than 80% of total DCE it is likely a daughter product of TCE; 1,1-DCE can be a chem. reaction product of		0.3U		0.58U	
				0.4U		0.56U	
VC*		Daughter product of DCE	2	0.4.U	0	0.35U	0
1,1,1-Trichloroethane*		Material released	0	0.3U	0	0.24U	0
DCA		Daughter product of TCA under reducing conditions	2	0.4U	0	0.7U	0
Carbon Tetrachloride		Material released	0	0.3U	0	0.3U	0
Chloroethane*		Daughter product of DCA or VC under reducing conditions	2	0.4U	0	0.33U	0
Ethene/Ethane	>0.01 mg/L	Daughter product of VC/ethene	2	0.005U 0.005U	0	0.0001U 0.0001U	0
	>0.1 mg/L	Daughter product of VC/ethene	3		0		0
Chloroform		Daughter product of Carbon Tetrachloride	2	0.3U	0	0.19U	0
Dichloromethane		Daughter product of Chloroform	2	NS		NS	
Heterotroph Plate Count**		<500 CFU/ml is low range; 900-2000 CFU/ml is moderate; >10,000 CFU/ml is high		354		300	

Notes:

* required analysis according to EPA Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater

Background of alkalinity and chloride used from MW-47 (NE site edge location) and MW42 (NW corner of site)

**Not part of the EPA screening process. A measurement conducted for additional information.

(a) Alkalinity background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background alkalinity: (257mg/L (MW42) + 256 mg/L (MW47))/2 = 256.5 mg/L. Twice background is 513 mg/L.

2006 determination of background alkalinity: (2*((241+318)/2)) = 559 mg/L

(b) Chloride 2x background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background chloride (50.9 mg/L (MW42) + 27.3 mg/L (MW47))/2 = 39 mg/L. Twice background is 78.2 mg/L.

2006 determination of background chloride (2*((41.9+89)/2))=130.9 mg/L

(c) Data is listed in this order: trans-1,2-DCE, 1,1-DCE, cis-1,2-DCE

(d) See Table 3A for specific data results where non-detect (ND) is listed above.

Natural Attenuation Screening Protocol MW33A		Interpretation		Score		Score	
		Inadequate evidence for anaerobic biodegradation* of chlorinated		0 to 5		2005 3	2006 -1
		Limited evidence for anaerobic biodegradation* of chlorinated		6 to 14			
		Adequate evidence for anaerobic biodegradation* of chlorinated		15 to 20		inadequate	inadequate
		Strong evidence for anaerobic biodegradation* of chlorinated		>20			
Concentration in Most Contam. Zone				2005		2006	
Analysis			Yes	Data	Points	Data (d)	Points
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at high concentrations	3	7.55	0	7.67	0
	> 5mg/L	Not tolerated; however, VC may be oxidized aerobically	-3		-3		-3
Nitrate*	<1 mg/L	At higher concentrations may compete with reductive pathway	2	3	0	3.6	0
Iron II* (ferrous-soluble)	>1 mg/L	Reductive pathway possible; VC may be oxidized to Fe(III)-reducing conditions	3	0.1U	0	0.1U	0
Sulfate*	<20 mg/L	At higher concentrations may compete with reductive pathway	2	105	0	84.8	0
Sulfide*	>1 mg/L	Reductive pathway possible	3	1U	0	2U	0
Methane*	>0.5 mg/L	Ultimate reductive daughter product, VC Accumulation (<0.5 VC oxidizes)	3	0.005U	0	0.0001U	0
Oxidation Reduction Potential* (ORP)	<50 millivolts (mV)	Reductive pathway possible	1	53	0	64	0
	<-100mV	Reductive pathway likely	2		0		0
pH*	5 < pH < 9	Optimal range for reductive pathway	0	7.24	0	7.09	0
	5>pH>9	Outside optimal range for reductive pathway	-2				
TOC	>20 mg/L	Carbon and energy source; drives dechlorination; of natural or anthropogenic	2	NS		NS	
Temperature*	>20°C	At T >20°C biochemical process is accelerated	1	16.61	0	18.95	0
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1	NS		NS	
Alkalinity ^(a)	>2x background 2005: 513 / 2006: 559	Results from interaction of carbon dioxide with aquifer minerals	1	313	0	306	0
Chloride* ^(b)	>2x background 2005: 78.2 / 2006: 130.9	Daughter product of organic chlorine	2	41.9	0	79.8	0
Hydrogen	>1 nM <1nM	Reductive pathway possible, VC may accumulate VC oxidized	3 0	NS		NS	
Volatile Fatty Acids	>0.1 mg/L	Intermediates resulting from biodegradation of aromatic compounds; carbon and energy source	2	NS		NS	
BTEX*	>0.1 mg/L (100 ug/L)	Carbon and energy source; drives dechlorination	2	ND	0	ND	0
PCE*		Material released	0	2.2	0	1	0
TCE*		Daughter product of PCE	2	4.7	2	2.5	2
DCE* ^(c)		Daughter product of TCE.	2	0.3U	2	0.38U	0
		If cis is greater than 80% of total DCE it is likely a daughter product of TCE; 1,1-DCE can be a chem. reaction product of	2.1			1.1	
			0.4U			0.56U	
VC*		Daughter product of DCE	2	0.4U	0	0.35U	0
1,1,1-Trichloroethane*		Material released	0	3.5	0	1.6	0
DCA		Daughter product of TCA under reducing conditions	2	0.6	2	0.7U	0
Carbon Tetrachloride		Material released	0	0.3U	0	0.3U	0
Chloroethane*		Daughter product of DCA or VC under reducing conditions	2	0.4U	0	0.33U	0
Ethene/Ethane	>0.01 mg/L	Daughter product of VC/ethene	2	0.005U 0.005U	0	0.0001U 0.0001U	0
	>0.1 mg/L	Daughter product of VC/ethene	3		0		0
Chloroform		Daughter product of Carbon Tetrachloride	2	0.3U	0	0.19U	0
Dichloromethane		Daughter product of Chloroform	2	NS		NS	
Heterotroph Plate Count**		<500 CFU/ml is low range; 900-2000 CFU/ml is moderate; >10,000 CFU/ml is high		152		1000	

Notes:

* required analysis according to EPA Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater

Background of alkalinity and chloride used from MW-47 (NE site edge location) and MW-42 (NW corner of site)

**Not part of the EPA screening process. A measurement conducted for additional information.

(a) Alkalinity background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background alkalinity: (257mg/L (MW42) + 256 mg/L (MW47))/2 = 256.5 mg/L. Twice background is 513 mg/L.

2006 determination of background alkalinity: (2*((241+318)/2)) = 559 mg/L

(b) Chloride 2x background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background chloride (50.9 mg/L (MW42) + 27.3 mg/L (MW47))/2 = 39 mg/L. Twice background is 78.2 mg/L.

2006 determination of background chloride (2*((41.9+89)/2))=130.9 mg/L

(c) Data is listed in this order: trans-1,2-DCE, 1,1-DCE, cis-1,2-DCE

(d) See Table 3A for specific data results where non-detect (ND) is listed above.

Natural Attenuation Screening Protocol MW34		Interpretation	Score	Score			
		Inadequate evidence for anaerobic biodegradation* of chlorinat	0 to 5	2005		2006	
		Limited evidence for anaerobic biodegradation* of chlorinated	6 to 14	1		1	
		Adequate evidence for anaerobic biodegradation* of chlorinat	15 to 20	inadequate		inadequate	
		Strong evidence for anaerobic biodegradation* of chlorinated	>20				
Concentration in Most Contam. Zone			Yes	2005		2006	
Analysis				Data	Points	Data (d)	Points
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at high concentrations	3	7.66	0	6.7	0
	> 5mg/L	Not tolerated; however, VC may be oxidized aerobically	-3		-3		-3
Nitrate*	<1 mg/L	At higher concentrations may compete with reductive pathway	2	5	0	3	0
Iron II* (ferrous-soluble)	>1 mg/L	Reductive pathway possible; VC may be oxidized to Fe(III)-reducing conditions	3	0.1U	0	0.1U	0
Sulfate*	<20 mg/L	At higher concentrations may compete with reductive pathway	2	89.3	0	66.9	0
Sulfide*	>1 mg/L	Reductive pathway possible	3	1U	0	2U	0
Methane*	>0.5 mg/L	Ultimate reductive daughter product, VC Accumulation (<0.5 VC oxidizes)	3	0.005U	0	0.0001U	0
Oxidation Reduction Potential* (ORP)	<50 millivolts (mV)	Reductive pathway possible	1	62	0	83	0
	<-100mV	Reductive pathway likely	2		0		0
pH*	5 < pH < 9	Optimal range for reductive pathway	0	7.18	0	7.13	0
	5>pH>9	Outside optimal range for reductive pathway	-2				
TOC	>20 mg/L	Carbon and energy source; drives dechlorination; of natural or anthropogenic	2	NS		NS	
Temperature*	>20°C	At T >20°C biochemical process is accelerated	1	16.89	0	17.37	0
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1	NS		NS	
Alkalinity ^(a)	>2x background 2005: 513 / 2006: 559	Results from interaction of carbon dioxide with aquifer minerals	1	327	0	303	0
Chloride* ^(b)	>2x background 2005: 78.2 / 2006: 130.9	Daughter product of organic chlorine	2	13.8	0	66.5	0
Hydrogen	>1 nM <1nM	Reductive pathway possible, VC may accumulate if VC oxidized	3 0	NS		NS	
Volatile Fatty Acids	>0.1 mg/L	Intermediates resulting from biodegradation of aromatic compounds; carbon and energy source	2	NS		NS	
BTEX*	>0.1 mg/L (100 ug/L)	Carbon and energy source; drives dechlorination	2	ND	0	ND	0
PCE*		Material released	0	1.8	0	1.7	0
TCE*		Daughter product of PCE	2	3.4	2	2.8	2
DCE* ^(c)		Daughter product of TCE. If cis is greater than 80% of total DCE it is likely a daughter product of TCE; 1,1-DCE can be a chem. reaction product of TCE	2	0.3U 0.6 0.9	2	0.38U 0.65J 0.8J	2
VC*		Daughter product of DCE	2	0.4U	0	0.35U	0
1,1,1-Trichloroethane*		Material released	0	2.4	0	1.9	0
DCA		Daughter product of TCA under reducing conditions	2	0.4U	0	0.7U	0
Carbon Tetrachloride		Material released	0	0.3U	0	0.3U	0
Chloroethane*		Daughter product of DCA or VC under reducing conditions	2	0.4U	0	0.33U	0
Ethene/Ethane	>0.01 mg/L	Daughter product of VC/ethene	2	0.005U 0.005U	0	0.0001U 0.0001U	0
	>0.1 mg/L	Daughter product of VC/ethene	3		0		0
Chloroform		Daughter product of Carbon Tetrachloride	2	0.3U	0	0.19U	0
Dichloromethane		Daughter product of Chloroform	2	NS		NS	
Heterotroph Plate Count**		<500 CFU/ml is low range; 900-2000 CFU/ml is moderate; >10,000 CFU/ml is high		371		100	

Notes:

* required analysis according to EPA Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater

Background of alkalinity and chloride used from MW-47 (NE site edge location) and MW42 (NW corner of site)

**Not part of the EPA screening process. A measurement conducted for additional information.

(a) Alkalinity background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background alkalinity: (257mg/L (MW42) + 256 mg/L (MW47))/2 = 256.5 mg/L. Twice background is 513 mg/L.

2006 determination of background alkalinity: (2*(241+318))/2 = 559 mg/L

(b) Chloride 2x background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background chloride (50.9 mg/L (MW42) + 27.3 mg/L (MW47))/2 = 39 mg/L. Twice background is 78.2 mg/L.

2006 determination of background chloride (2*((41.9+89)/2)=130.9 mg/L)

(c) Data is listed in this order: trans-1,2-DCE, 1,1-DCE, cis-1,2-DCE

(d) See Table 3A for specific data results where non-detect (ND) is listed above.

Natural Attenuation Screening Protocol MW35		Interpretation	Score	Score			
		Inadequate evidence for anaerobic biodegradation* of chlorinated compounds	0 to 5	2005 3	inadequate	2006 3	inadequate
		Limited evidence for anaerobic biodegradation* of chlorinated compounds	6 to 14				
		Adequate evidence for anaerobic biodegradation* of chlorinated compounds	15 to 20				
		Strong evidence for anaerobic biodegradation* of chlorinated compounds	>20				
Concentration in Most Contam. Zone			Yes	2005		2006	
Analysis				Data	Points	Data (d)	Points
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at high concentrations	3	9.35	0	7.44	0
	> 5mg/L	Not tolerated; however, VC may be oxidized aerobically	-3		-3		-3
Nitrate*	<1 mg/L	At higher concentrations may compete with reductive pathway	2	2.1	0	2.6	0
Iron II* (ferrous-soluble)	>1 mg/L	Reductive pathway possible; VC may be oxidized to Fe(III)-reducing conditions	3	0.1U	0	0.1U	0
Sulfate*	<20 mg/L	At higher concentrations may compete with reductive pathway	2	78.1	0	83.9	0
Sulfide*	>1 mg/L	Reductive pathway possible	3	1	0	2U	0
Methane*	>0.5 mg/L	Ultimate reductive daughter product, VC Accumulates (<0.5 VC oxidizes)	3	0.005U	0	0.0001U	0
Oxidation Reduction Potential* (ORP)	<50 millivolts (mV)	Reductive pathway possible	1	80	0	92	0
	<-100mV	Reductive pathway likely	2		0		0
pH*	5 < pH < 9	Optimal range for reductive pathway	0	7.04	0	7.06	0
	5>pH>9	Outside optimal range for reductive pathway	-2				
TOC	>20 mg/L	Carbon and energy source; drives dechlorination; of natural or anthropogenic	2	NS		NS	
Temperature*	>20°C	At T >20°C biochemical process is accelerated	1	14.18	0	14.76	0
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1	NS		NS	
Alkalinity ^(a)	>2x background 2005: 513 / 2006: 559	Results from interaction of carbon dioxide with aquifer minerals	1	370	0	331	0
Chloride* ^(b)	>2x background 2005: 78.2 / 2006: 130.9	Daughter product of organic chlorine	2	18.6	0	29.5	0
Hydrogen	>1 nM	Reductive pathway possible, VC may accumulate	3	NS		NS	
	<1nM	VC oxidized	0				
Volatile Fatty Acids	>0.1 mg/L	Intermediates resulting from biodegradation of aromatic compounds; carbon and energy source	2	NS		NS	
BTEX*	>0.1 mg/L (100 ug/L)	Carbon and energy source; drives dechlorination	2	ND	0	ND	0
PCE*		Material released	0	3.3	0	2.5	0
TCE*		Daughter product of PCE	2	8.4	2	6.3	2
DCE* ^(c)		Daughter product of TCE.	2	0.3U	2	0.38U	2
		If cis is greater than 80% of total DCE it is likely a daughter product of TCE; 1,1-DCE can be a chem. reaction product of TCE		6.6		4.2	
				0.4U		0.56U	
VC*		Daughter product of DCE	2	0.4U	0	0.35U	0
1,1,1-Trichloroethane*		Material released	0	130	0	88.9	0
DCA		Daughter product of TCA under reducing conditions	2	50	2	17.1	2
Carbon Tetrachloride		Material released	0	0.3U	0	0.3U	0
Chloroethane*		Daughter product of DCA or VC under reducing conditions	2	0.4U	0	0.33U	0
Ethene/Ethane	>0.01 mg/L	Daughter product of VC/ethene	2	0.005U 0.005U	0	0.0001U 0.0001U	0
	>0.1 mg/L	Daughter product of VC/ethene	3		0		0
Chloroform		Daughter product of Carbon Tetrachloride	2	0.3U	0	0.19U	0
Dichloromethane		Daughter product of Chloroform	2	NS		NS	
Heterotroph Plate Count**		<500 CFU/ml is low range; 900-2000 CFU/ml is moderate; >10,000 CFU/ml is high		1590		500	

Notes:

* required analysis according to EPA Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater

Background of alkalinity and chloride used from MW-47 (NE site edge location) and MW42 (NW corner of site)

**Not part of the EPA screening process. A measurement conducted for additional information.

(a) Alkalinity background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background alkalinity: (257mg/L (MW42) + 256 mg/L (MW47))/2 = 256.5 mg/L. Twice background is 513 mg/L.

2006 determination of background alkalinity: (2*(241+318)/2) = 559 mg/L

(b) Chloride 2x background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background chloride (50.9 mg/L (MW42) + 27.3 mg/L (MW47))/2 = 39 mg/L. Twice background is 78.2 mg/L.

2006 determination of background chloride (2*((41.9+89)/2))=130.9 mg/L

(c) Data is listed in this order: trans-1,2-DCE, 1,1-DCE, cis-1,2-DCE

(d) See Table 3A for specific data results where non-detect (ND) is listed above.

Natural Attenuation Screening Protocol		Interpretation	Score	Score				
		Inadequate evidence for anaerobic biodegradation* of chlorinated	0 to 5		2005 -1	2006 -3	inadequate	inadequate
		Limited evidence for anaerobic biodegradation* of chlorinated	6 to 14					
MW37		Adequate evidence for anaerobic biodegradation* of chlorinated	15 to 20					
		Strong evidence for anaerobic biodegradation* of chlorinated	>20					
Concentration in Most Contam. Zone			Yes	2005		2006		
Analysis				Data	Points	Data (d)	Points	
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at high concentrations	3	9.23	0	7.55	0	
	> 5mg/L	Not tolerated; however, VC may be oxidized aerobically	-3		-3		-3	
Nitrate*	<1 mg/L	At higher concentrations may compete with reductive pathway	2	11.5	0	16.4	0	
Iron II* (ferrous-soluble)	>1 mg/L	Reductive pathway possible; VC may be oxidized to Fe(III)-reducing conditions	3	0.1U	0	0.1U	0	
Sulfate*	<20 mg/L	At higher concentrations may compete with reductive pathway	2	36.5	0	25.6	0	
Sulfide*	>1 mg/L	Reductive pathway possible	3	1U	0	2U	0	
Methane*	>0.5 mg/L	Ultimate reductive daughter product, VC Accumulation (<0.5 VC oxidizes)	3	0.005U	0	0.0001U	0	
Oxidation Reduction Potential* (ORP)	<50 millivolts (mV)	Reductive pathway possible	1	51	0	75	0	
	<-100mV	Reductive pathway likely	2		0		0	
pH*	5 < pH < 9	Optimal range for reductive pathway	0	7.22	0	7.26	0	
	5>pH>9	Outside optimal range for reductive pathway	-2					
TOC	>20 mg/L	Carbon and energy source; drives dechlorination; of natural or anthropogenic	2	NS		NS		
Temperature*	>20°C	At T >20°C biochemical process is accelerated	1	13.6	0	13.79	0	
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1	NS		NS		
Alkalinity ^(a)	>2x background 2005: 513 / 2006: 559	Results from interaction of carbon dioxide with aquifer minerals	1	348	0	324	0	
Chloride* ^(b)	>2x background 2005: 78.2 / 2006: 130.9	Daughter product of organic chlorine	2	12.1	0	10.5	0	
Hydrogen	>1 nM	Reductive pathway possible, VC may accumulate	3	NS		NS		
	<1nM	VC oxidized	0					
Volatile Fatty Acids	>0.1 mg/L	Intermediates resulting from biodegradation of aromatic compounds; carbon and energy source	2	NS		NS		
BTEX*	>0.1 mg/L (100 ug/L)	Carbon and energy source; drives dechlorination	2	ND	0	ND	0	
PCE*		Material released	0	0.4U	0	0.28U	0	
TCE*		Daughter product of PCE	2	25	0	17.4	0	
DCE* ^(c)		Daughter product of TCE.	2	0.3U	0	0.38U	0	
		If cis is greater than 80% of total DCE it is likely a daughter product of TCE; 1,1-DCE can be a chem. reaction product of		0.3U		0.58U		
				0.4U		0.56U		
VC*		Daughter product of DCE	2	0.4U	0	0.35U	0	
1,1,1-Trichloroethane*		Material released	0	0.3U	0	0.24U	0	
DCA		Daughter product of TCA under reducing conditions	2	0.4U	0	0.7U	0	
Carbon Tetrachloride		Material released	0	2.5	0	2.7	0	
Chloroethane*		Daughter product of DCA or VC under reducing conditions	2	0.4U	0	0.33U	0	
Ethene/Ethane	>0.01 mg/L	Daughter product of VC/ethene	2	0.005U 0.005U	0	0.0001U 0.0001U	0	
	>0.1 mg/L	Daughter product of VC/ethene	3		0		0	
Chloroform		Daughter product of Carbon Tetrachloride	2	0.4	2	0.19U	0	
Dichloromethane		Daughter product of Chloroform	2	NS		NS		
Heterotroph Plate Count**		<500 CFU/ml is low range; 900-2000 CFU/ml is moderate; >10,000 CFU/ml is high		18870		23600		

Notes:

* required analysis according to EPA Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater

Background of alkalinity and chloride used from MW-47 (NE site edge location) and MW42 (NW corner of site)

**Not part of the EPA screening process. A measurement conducted for additional information.

(a) Alkalinity background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background alkalinity: (257mg/L (MW42) + 256 mg/L (MW47))/2 = 256.5 mg/L. Twice background is 513 mg/L.

2006 determination of background alkalinity: (2*((241+318)/2)) = 559 mg/L

(b) Chloride 2x background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background chloride (50.9 mg/L (MW42) + 27.3 mg/L (MW47))/2 = 39 mg/L. Twice background is 78.2 mg/L.

2006 determination of background chloride (2*((41.9+89)/2))=130.9 mg/L

(c) Data is listed in this order: trans-1,2-DCE, 1,1-DCE, cis-1,2-DCE

(d) See Table 3A for specific data results where non-detect (ND) is listed above.

Natural Attenuation Screening Protocol MW42		Interpretation	Score	Score					
		Inadequate evidence for anaerobic biodegradation* of chlorinated	0 to 5	2005 -3		2006 -3			
		Limited evidence for anaerobic biodegradation* of chlorinated	6 to 14						
		Adequate evidence for anaerobic biodegradation* of chlorinated	15 to 20	inadequate		inadequate			
		Strong evidence for anaerobic biodegradation* of chlorinated	>20						
Concentration in Most Contam. Zone			Yes	2005		2006			
Analysis				Data	Points	Data (d)	Points		
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at high concentrations	3	9.09	0	7.93	0		
	> 5mg/L	Not tolerated; however, VC may be oxidized aerobically	-3		-3		-3		
Nitrate*	<1 mg/L	At higher concentrations may compete with reductive pathway	2	5	0	4.4	0		
Iron II* (ferrous-soluble)	>1 mg/L	Reductive pathway possible; VC may be oxidized to Fe(III)-reducing conditions	3	0.1U	0	ND	0		
Sulfate*	<20 mg/L	At higher concentrations may compete with reductive pathway	2	21.9	0	25.4	0		
Sulfide*	>1 mg/L	Reductive pathway possible	3	1U	0	2U	0		
Methane*	>0.5 mg/L	Ultimate reductive daughter product, VC Accumulates (<0.5 VC oxidizes)	3	0.005U	0	0.0001U	0		
Oxidation Reduction Potential* (ORP)	<50 millivolts (mV)	Reductive pathway possible	1	106	0	102	0		
	<-100mV	Reductive pathway likely	2		0		0		
pH*	5 < pH < 9	Optimal range for reductive pathway	0	7.23	0	7.18	0		
	5>pH>9	Outside optimal range for reductive pathway	-2						
TOC	>20 mg/L	Carbon and energy source; drives dechlorination; of natural or anthropogenic	2	NS		NS			
Temperature*	>20°C	At T >20°C biochemical process is accelerated	1	14	0	13.81	0		
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1	NS		NS			
Alkalinity ^(a)	>2x background 2005: 513 / 2006: 559	Results from interaction of carbon dioxide with aquifer minerals	1	257	0	241	0		
Chloride* ^(b)	>2x background 2005: 78.2 / 2006: 130.9	Daughter product of organic chlorine	2	50.9	0	41.9	0		
Hydrogen	>1 nM	Reductive pathway possible, VC may accumulate	3	NS		NS			
	<1nM	VC oxidized	0						
Volatile Fatty Acids	>0.1 mg/L	Intermediates resulting from biodegradation of aromatic compounds; carbon and energy source	2	NS		NS			
BTEX*	>0.1 mg/L (100 ug/L)	Carbon and energy source; drives dechlorination	2	ND	0	ND	0		
PCE*		Material released	0	ND	0	ND	0		
TCE*		Daughter product of PCE	2	ND	0	ND	0		
DCE* ^(c)		Daughter product of TCE. If cis is greater than 80% of total DCE it is likely a daughter product of TCE; 1,1-DCE can be a chem. reaction product of TCA	2	ND	0	ND	0		
VC*		Daughter product of DCE	2	ND	0	ND	0		
1,1,1-Trichloroethane*		Material released	0	ND	0	ND	0		
DCA		Daughter product of TCA under reducing conditions	2	ND	0	ND	0		
Carbon Tetrachloride		Material released	0	ND	0	ND	0		
Chloroethane*		Daughter product of DCA or VC under reducing conditions	2	ND	0	ND	0		
Ethene/Ethane	>0.01 mg/L	Daughter product of VC/ethene	2	0.005U 0.005U	0	0.0001U 0.0001U	0		
	>0.1 mg/L	Daughter product of VC/ethene	3		0		0		
Chloroform		Daughter product of Carbon Tetrachloride	2	ND	0	ND	0		
Dichloromethane		Daughter product of Chloroform	2	NS		NS			
Heterotroph Plate Count**		<500 CFU/ml is low range; 900-2000 CFU/ml is moderate; >10,000 CFU/ml is high		920		100			

Notes:

Only VOC data available from May 2002.

* required analysis according to EPA Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater

Background of alkalinity and chloride used from MW-47 (NE site edge location) and MW42 (NW corner of site)

**Not part of the EPA screening process. A measurement conducted for additional information.

(a) Alkalinity background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background alkalinity: (257mg/L (MW42) + 256 mg/L (MW47))/2 = 256.5 mg/L. Twice background is 513 mg/L.

2006 determination of background alkalinity: (2*((241+318)/2)) = 559 mg/L

(b) Chloride 2x background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background chloride (50.9 mg/L (MW42) + 27.3 mg/L (MW47))/2 = 39 mg/L. Twice background is 78.2 mg/L.

2006 determination of background chloride (2*((41.9+89)/2))=130.9 mg/L

(c) Data is listed in this order: trans-1,2-DCE, 1,1-DCE, cis-1,2-DCE

(d) See Table 3A for specific data results where non-detect (ND) is listed above.

Natural Attenuation Screening Protocol		Interpretation	Score	Score			
		Inadequate evidence for anaerobic biodegradation* of chlorinated	0 to 5	2005 -3		2006 -3	
		Limited evidence for anaerobic biodegradation* of chlorinated	6 to 14				
MW47		Adequate evidence for anaerobic biodegradation* of chlorinated	15 to 20	inadequate			
		Strong evidence for anaerobic biodegradation* of chlorinated	>20	inadequate			
Concentration in Most Contam. Zone			Yes	2005		2006	
Analysis				Data	Points	Data (d)	Points
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at high concentrations	3	9.39	0	7.47	0
	> 5mg/L	Not tolerated; however, VC may be oxidized aerobically	-3		-3		-3
Nitrate*	<1 mg/L	At higher concentrations may compete with reductive pathway	2	5.6	0	2.2	0
Iron II* (ferrous-soluble)	>1 mg/L	Reductive pathway possible; VC may be oxidized to Fe(III)-reducing conditions	3	0.1U	0	0.1U	0
Sulfate*	<20 mg/L	At higher concentrations may compete with reductive pathway	2	35	0	65.2	0
Sulfide*	>1 mg/L	Reductive pathway possible	3	1U	0	2U	0
Methane*	>0.5 mg/L	Ultimate reductive daughter product, VC Accumulation (<0.5 VC oxidizes)	3	0.005U	0	0.0236	0
Oxidation Reduction Potential* (ORP)	<50 millivolts (mV)	Reductive pathway possible	1	121	0	71	0
	<-100mV	Reductive pathway likely	2		0		0
pH*	5 < pH < 9 5>pH>9	Optimal range for reductive pathway Outside optimal range for reductive pathway	0 -2	7.1	0	6.91	0
TOC	>20 mg/L	Carbon and energy source; drives dechlorination; of natural or anthropogenic	2	NS		NS	
Temperature*	>20°C	At T >20°C biochemical process is accelerated	1	13.26	0	13.43	0
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1	NS		NS	
Alkalinity ^(a)	>2x background 2005: 513 / 2006: 559	Results from interaction of carbon dioxide with aquifer minerals	1	256	0	318	0
Chloride* ^(b)	>2x background 2005: 78.2 / 2006: 130.9	Daughter product of organic chlorine	2	27.3	0	89	0
Hydrogen	>1 nM <1nM	Reductive pathway possible, VC may accumulate VC oxidized	3 0	NS		NS	
Volatile Fatty Acids	>0.1 mg/L	Intermediates resulting from biodegradation of aromatic compounds; carbon and energy source	2	NS		NS	
BTEX*	>0.1 mg/L (100 ug/L)	Carbon and energy source; drives dechlorination	2	ND	0	ND	0
PCE*		Material released	0	0.4U	0	0.28U	0
TCE*		Daughter product of PCE	2	0.4U	0	0.2U	0
DCE* ^(c)		Daughter product of TCE. If cis is greater than 80% of total DCE it is likely a daughter product of TCE; 1,1-DCE can be a chem. reaction product of	2	0.3U 0.3U 0.4U	0	0.38U 0.58U 0.56U	0
VC*		Daughter product of DCE	2	0.4U	0	0.35U	0
1,1,1-Trichloroethane*		Material released	0	0.3U	0	0.24U	0
DCA		Daughter product of TCA under reducing conditions	2	0.4U	0	0.7U	0
Carbon Tetrachloride		Material released	0	0.3U	0	0.3U	0
Chloroethane*		Daughter product of DCA or VC under reducing conditions	2	0.4U	0	0.33U	0
Ethene/Ethane	>0.01 mg/L	Daughter product of VC/ethene	2	0.005U 0.005U	0	0.0001U 0.0001U	0
	>0.1 mg/L	Daughter product of VC/ethene	3		0		
Chloroform		Daughter product of Carbon Tetrachloride	2	0.3U	0	0.19U	0
Dichloromethane		Daughter product of Chloroform	2	NS	0	NS	
Heterotroph Plate Count**		<500 CFU/ml is low range; 900-2000 CFU/ml is moderate; >10,000 CFU/ml is high		486		200	

Notes:

* required analysis according to EPA Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater

Background of alkalinity and chloride used from MW-47 (NE site edge location) and MW42 (NW corner of site)

**Not part of the EPA screening process. A measurement conducted for additional information.

(a) Alkalinity background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background alkalinity: (257mg/L (MW42) + 256 mg/L (MW47))/2 = 256.5 mg/L. Twice background is 513 mg/L.

2006 determination of background alkalinity: (2*((241+318)/2)) = 559 mg/L

(b) Chloride 2x background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background chloride (50.9 mg/L (MW42) + 27.3 mg/L (MW47))/2 = 39 mg/L. Twice background is 78.2 mg/L.

2006 determination of background chloride (2*((41.9+89)/2))=130.9 mg/L

(c) Data is listed in this order: trans-1,2-DCE, 1,1-DCE, cis-1,2-DCE

(d) See Table 3A for specific data results where non-detect (ND) is listed above.

Natural Attenuation Screening Protocol		Interpretation	Score	Score			
		Inadequate evidence for anaerobic biodegradation* of chlorinated compounds	0 to 5	2005 -3	2006 -3		
			Limited evidence for anaerobic biodegradation* of chlorinated compounds				6 to 14
MW49		Adequate evidence for anaerobic biodegradation* of chlorinated compounds	15 to 20	inadequate			
		Strong evidence for anaerobic biodegradation* of chlorinated compounds	>20	inadequate			
Concentration in Most Contam. Zone			2005			2006	
Analysis			Yes	Data	Points	Data (d)	Points
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at high concentrations	3	8.91	0	8.31	0
	> 5mg/L	Not tolerated; however, VC may be oxidized aerobically	-3		-3		-3
Nitrate*	<1 mg/L	At higher concentrations may compete with reductive pathway	2	7.6	0	7	0
Iron II* (ferrous-soluble)	>1 mg/L	Reductive pathway possible; VC may be oxidized to Fe(III)-reducing conditions	3	0.1U	0	0.2U	0
Sulfate*	<20 mg/L	At higher concentrations may compete with reductive pathway	2	26.2	0	28	0
Sulfide*	>1 mg/L	Reductive pathway possible	3	1U	0	2U	0
Methane*	>0.5 mg/L	Ultimate reductive daughter product, VC Accumulates (<0.5 VC oxidizes)	3	0.005U	0	0.0001U	0
Oxidation Reduction Potential* (ORP)	<50 millivolts (mV)	Reductive pathway possible	1	146	0	81	0
	<-100mV	Reductive pathway likely	2		0		0
pH*	5 < pH < 9 5>pH>9	Optimal range for reductive pathway Outside optimal range for reductive pathway	0 -2	7.23	0	7.3	0
TOC	>20 mg/L	Carbon and energy source; drives dechlorination; of natural or anthropogenic	2	NS		NS	
Temperature*	>20°C	At T >20°C biochemical process is accelerated	1	11.52	0	11.61	0
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1	NS		NS	
Alkalinity ^(a)	>2x background 2005: 513 / 2006: 559	Results from interaction of carbon dioxide with aquifer minerals	1	208	0	201	0
Chloride* ^(b)	>2x background 2005: 78.2 / 2006: 130.9	Daughter product of organic chlorine	2	32.5	0	33.4	0
Hydrogen	>1 nM <1nM	Reductive pathway possible, VC may accumulate VC oxidized	3 0	NS		NS	
Volatile Fatty Acids	>0.1 mg/L	Intermediates resulting from biodegradation of aromatic compounds; carbon and energy source	2	NS		NS	
BTEX*	>0.1 mg/L (100 ug/L)	Carbon and energy source; drives dechlorination	2	ND	0	ND	0
PCE*		Material released	0	0.4U	0	0.28U	0
TCE*		Daughter product of PCE	2	0.4U	0	0.2U	0
DCE* ^(c)		Daughter product of TCE. If cis is greater than 80% of total DCE it is likely a daughter product of TCE; 1,1-DCE can be a chem. reaction product of TCE	2	0.3U 0.3U 0.4U	0	0.38U 0.58U 0.56U	0
VC*		Daughter product of DCE	2	0.4U	0	0.35U	0
1,1,1-Trichloroethane*		Material released	0	0.3U	0	0.24U	0
DCA		Daughter product of TCA under reducing conditions	2	0.4U	0	0.7U	0
Carbon Tetrachloride		Material released	0	0.3U	0	0.3U	0
Chloroethane*		Daughter product of DCA or VC under reducing conditions	2	0.4U	0	0.33U	0
Ethene/Ethane	>0.01 mg/L	Daughter product of VC/ethene	2	0.005U 0.005U	0	0.0001U 0.0001U	0
	>0.1 mg/L	Daughter product of VC/ethene	3		0		
Chloroform		Daughter product of Carbon Tetrachloride	2	0.3U	0	0.19U	0
Dichloromethane		Daughter product of Chloroform	2	NS	0	NS	
Heterotroph Plate Count**		<500 CFU/ml is low range; 900-2000 CFU/ml is moderate; >10,000 CFU/ml is high		505		600	

Notes:

* required analysis according to EPA Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater

Background of alkalinity and chloride used from MW-47 (NE site edge location) and MW42 (NW corner of site)

**Not part of the EPA screening process. A measurement conducted for additional information.

(a) Alkalinity background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background alkalinity: (257mg/L (MW42) + 256 mg/L (MW47))/2 = 256.5 mg/L. Twice background is 513 mg/L.

2006 determination of background alkalinity: (2*((241+318)/2)) = 559 mg/L

(b) Chloride 2x background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background chloride (50.9 mg/L (MW42) + 27.3 mg/L (MW47))/2 = 39 mg/L. Twice background is 78.2 mg/L.

2006 determination of background chloride (2*((41.9+89)/2))=130.9 mg/L

(c) Data is listed in this order: trans-1,2-DCE, 1,1-DCE, cis-1,2-DCE

(d) See Table 3A for specific data results where non-detect (ND) is listed above.

Natural Attenuation Screening Protocol MW51A		Interpretation	Score	Score			
		Inadequate evidence for anaerobic biodegradation* of chlorinated solvents	0 to 5	2005 -2		2006 -2	
		Limited evidence for anaerobic biodegradation* of chlorinated solvents	6 to 14				
		Adequate evidence for anaerobic biodegradation* of chlorinated solvents	15 to 20	inadequate		inadequate	
		Strong evidence for anaerobic biodegradation* of chlorinated solvents	>20				
Concentration in Most Contam. Zone			Yes	2005		2006	
Analysis				Data	Points	Data (d)	Points
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at high concentrations	3	7.14	0	5.97	0
	> 5mg/L	Not tolerated; however, VC may be oxidized aerobically	-3		-3		-3
Nitrate*	<1 mg/L	At higher concentrations may compete with reductive pathway	2	3.7	0	3.5	0
Iron II* (ferrous-soluble)	>1 mg/L	Reductive pathway possible; VC may be oxidized under Fe(III)-reducing conditions	3	0.1U	0	0.1U	0
Sulfate*	<20 mg/L	At higher concentrations may compete with reductive pathway	2	31.8	0	28.4	0
Sulfide*	>1 mg/L	Reductive pathway possible	3	1U	0	2U	0
Methane*	>0.5 mg/L	Ultimate reductive daughter product, VC Accumulation (<0.5 VC oxidizes)	3	0.005U	0	0.00015	0
Oxidation Reduction Potential* (ORP)	<50 millivolts (mV)	Reductive pathway possible	1	25	1	9	1
	<-100mV	Reductive pathway likely	2		0		0
pH*	5 < pH < 9 5>pH>9	Optimal range for reductive pathway Outside optimal range for reductive pathway	0 -2	7.43	0	7.19	0
TOC	>20 mg/L	Carbon and energy source; drives dechlorination; of natural or anthropogenic	2	NS		NS	
Temperature*	>20°C	At T >20°C biochemical process is accelerated	1	15.11	0	16.53	0
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1	NS		NS	
Alkalinity ^(a)	>2x background 2005: 513 / 2006: 559	Results from interaction of carbon dioxide with aquifer minerals	1	246	0	243	0
Chloride* ^(b)	>2x background 2005: 78.2 / 2006: 130.9	Daughter product of organic chlorine	2	52.4	0	51.3	0
Hydrogen	>1 nM <1nM	Reductive pathway possible, VC may accumulate VC oxidized	3 0	NS		NS	
Volatile Fatty Acids	>0.1 mg/L	Intermediates resulting from biodegradation of aromatic compounds; carbon and energy source	2	NS		NS	
BTEX*	>0.1 mg/L (100 ug/L)	Carbon and energy source; drives dechlorination	2	ND	0	ND	0
PCE*		Material released	0	0.4U	0	0.28U	0
TCE*		Daughter product of PCE	2	0.4U	0	0.2U	0
DCE* ^(c)		Daughter product of TCE.	2	0.3U	0	0.38U	0
		If cis is greater than 80% of total DCE it is likely a daughter product of TCE; 1,1-DCE can be a chem. reaction product of TCE		0.3U		0.58U	
				0.4U		0.56U	
VC*		Daughter product of DCE	2	0.4U	0	0.35U	0
1,1,1-Trichloroethane*		Material released	0	0.3U	0	0.24U	0
DCA		Daughter product of TCA under reducing conditions	2	0.4U	0	0.7U	0
Carbon Tetrachloride		Material released	0	0.3U	0	0.3U	0
Chloroethane*		Daughter product of DCA or VC under reducing conditions	2	0.4U	0	0.33U	0
Ethene/Ethane	>0.01 mg/L	Daughter product of VC/ethene	2	0.005U 0.005U	0	0.0001U 0.0001U	0
	>0.1 mg/L	Daughter product of VC/ethene	3		0		
Chloroform		Daughter product of Carbon Tetrachloride	2	0.3U	0	0.19U	0
Dichloromethane		Daughter product of Chloroform	2	NS		NS	
Heterotroph Plate Count**		<500 CFU/ml is low range; 900-2000 CFU/ml is moderate; >10,000 CFU/ml is high		1220		100	

Notes:

* required analysis according to EPA Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater

Background of alkalinity and chloride used from MW-47 (NE site edge location) and MW42 (NW corner of site)

**Not part of the EPA screening process. A measurement conducted for additional information.

(a) Alkalinity background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background alkalinity: (257mg/L (MW42) + 256 mg/L (MW47))/2 = 256.5 mg/L. Twice background is 513 mg/L.

2006 determination of background alkalinity: (2*(241+318)/2) = 559 mg/L

(b) Chloride 2xbackground calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background chloride (50.9 mg/L (MW42) + 27.3 mg/L (MW47))/2 = 39 mg/L. Twice background is 78.2 mg/L.

2006 determination of background chloride (2*((41.9+89)/2))=130.9 mg/L

(c) Data is listed in this order: trans-1,2-DCE, 1,1-DCE, cis-1,2-DCE

(d) See Table 3A for specific data results where non-detect (ND) is listed above.

Natural Attenuation Screening Protocol			Interpretation		Score		Score	
MW53			Inadequate evidence for anaerobic biodegradation* of chlorinated	0 to 5		2005 4	2006 6	
			Limited evidence for anaerobic biodegradation* of chlorinated	6 to 14				
			Adequate evidence for anaerobic biodegradation* of chlorinated	15 to 20		inadequate	limited	
			Strong evidence for anaerobic biodegradation* of chlorinated	>20				
Concentration in Most Contam. Zone				Yes	2005		2006	
Analysis					Data	Points	Data (d)	Points
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at high concentrations	3	4	0	1.7	0	
	> 5mg/L	Not tolerated; however, VC may be oxidized aerobically	-3		0		0	
Nitrate*	<1 mg/L	At higher concentrations may compete with reductive pathway	2	0.1U	2	0.15	2	
Iron II* (ferrous-soluble)	>1 mg/L	Reductive pathway possible; VC may be oxidized under Fe(III)-reducing conditions	3	0.28	0	0.2U	0	
Sulfate*	<20 mg/L	At higher concentrations may compete with reductive pathway	2	45.4	0	16.8	2	
Sulfide*	>1 mg/L	Reductive pathway possible	3	1U	0	2U	0	
Methane*	>0.5 mg/L	Ultimate reductive daughter product, VC Accumulates (<0.5 VC oxidizes)	3	0.013	0	0.00393	0	
Oxidation Reduction Potential* (ORP)	<50 millivolts (mV)	Reductive pathway possible	1	-68	1	-36	1	
	<-100mV	Reductive pathway likely	2		0		0	
pH*	5 < pH < 9	Optimal range for reductive pathway	0	6.68	0	6.69	0	
	5>pH>9	Outside optimal range for reductive pathway	-2					
TOC	>20 mg/L	Carbon and energy source; drives dechlorination; of natural or anthropogenic	2	NS		NS		
Temperature*	>20°C	At T >20°C biochemical process is accelerated	1	17.79	0	19.31	0	
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1	NS		NS		
Alkalinity ^(a)	>2x background 2005: 513 / 2006: 559	Results from interaction of carbon dioxide with aquifer minerals	1	768	1	764	1	
Chloride* ^(b)	>2x background 2005: 78.2 / 2006: 130.9	Daughter product of organic chlorine	2	50.9	0	57.2	0	
Hydrogen	>1 nM	Reductive pathway possible; VC may accumulate	3	NS		NS		
	<1nM	VC oxidized	0					
Volatile Fatty Acids	>0.1 mg/L	Intermediates resulting from biodegradation of aromatic compounds; carbon and energy source	2	NS		NS		
BTEX*	>0.1 mg/L (100 ug/L)	Carbon and energy source; drives dechlorination	2	ND	0	ND	0	
PCE*		Material released	0	0.4U	0	0.28U	0	
TCE*		Daughter product of PCE	2	0.4U	0	0.2U	0	
DCE* ^(c)		Daughter product of TCE.	2	0.3U	0	0.38U	0	
		If cis is greater than 80% of total DCE it is likely a daughter product of TCE; 1,1-DCE can be a chem. reaction product of		0.3U		0.58U		
				0.4U		0.56U		
VC*		Daughter product of DCE	2	0.4U	0	0.35U	0	
1,1,1-Trichloroethane*		Material released	0	0.3U	0	0.24U	0	
DCA		Daughter product of TCA under reducing conditions	2	0.4U	0	0.7U	0	
Carbon Tetrachloride		Material released	0	0.3U	0	0.3U	0	
Chloroethane*		Daughter product of DCA or VC under reducing conditions	2	0.4U	0	0.33U	0	
Ethene/Ethane	>0.01 mg/L	Daughter product of VC/ethene	2	0.005U 0.005U	0	0.0001U 0.0001U	0	
	>0.1 mg/L	Daughter product of VC/ethene	3		0			
Chloroform		Daughter product of Carbon Tetrachloride	2	0.3U	0	0.19U	0	
Dichloromethane		Daughter product of Chloroform	2	NS		NS		
Heterotroph Plate Count**				51700		2900		

Notes:

* required analysis according to EPA Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater Background of alkalinity and chloride used from MW-47 (NE site edge location) and MW42 (NW corner of site)

**Not part of the EPA screening process. A measurement conducted for additional information.

(a) Alkalinity background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background alkalinity: (257mg/L (MW42) + 256 mg/L (MW47))/2 = 256.5 mg/L. Twice background is 513 mg/L.

2006 determination of background alkalinity: (2*((241+318)/2)) = 559 mg/L

(b) Chloride 2xbackground calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background chloride (50.9 mg/L (MW42) + 27.3 mg/L (MW47))/2 = 39 mg/L. Twice background is 78.2 mg/L.

2006 determination of background chloride (2*((41.9+89)/2))=130.9 mg/L

(c) Data is listed in this order: trans-1,2-DCE, 1,1-DCE, cis-1,2-DCE

(d) See Table 3A for specific data results where non-detect (ND) is listed above.

Natural Attenuation Screening Protocol		Interpretation	Score	Score			
		Inadequate evidence for anaerobic biodegradation* of chlorinated solvents	0 to 5	2005 21	2006 16	strong	adequate
		Limited evidence for anaerobic biodegradation* of chlorinated solvents	6 to 14				
RW09		Adequate evidence for anaerobic biodegradation* of chlorinated solvents	15 to 20				
		Strong evidence for anaerobic biodegradation* of chlorinated solvents	>20				
Concentration in Most Contam. Zone			Yes	Data	2005 Points	2006 Data (d)	2006 Points
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at high concentrations	3	2.94	0	2.25	0
	> 5mg/L	Not tolerated; however, VC may be oxidized aerobically	-3		0		0
Nitrate*	<1 mg/L	At higher concentrations may compete with reductive pathway	2	0.1U	2	0.11U	2
Iron II* (ferrous-soluble)	>1 mg/L	Reductive pathway possible; VC may be oxidized to Fe(III)-reducing conditions	3	3.3	3	0.2U	0
Sulfate*	<20 mg/L	At higher concentrations may compete with reductive pathway	2	5U	2	2U	2
Sulfide*	>1 mg/L	Reductive pathway possible	3	1U	0	2U	0
Methane*	>0.5 mg/L	Ultimate reductive daughter product, VC Accumulation (<0.5 VC oxidizes)	3	3.6	3	8.33	3
Oxidation Reduction Potential* (ORP)	<50 millivolts (mV)	Reductive pathway possible	1	-187	1	-179	1
	<-100mV	Reductive pathway likely	2		2		2
pH*	5 < pH < 9 5>pH>9	Optimal range for reductive pathway Outside optimal range for reductive pathway	0 -2	7.17	0	7.08	0
TOC	>20 mg/L	Carbon and energy source; drives dechlorination; natural or anthropogenic	2	NS		NS	
Temperature*	>20°C	At T >20°C biochemical process is accelerated	1	17.64	0	17.41	0
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1	NS		NS	
Alkalinity ^(a)	>2x background 2005: 513 / 2006: 559	Results from interaction of carbon dioxide with aquifer minerals	1	312U	0	283	0
Chloride* ^(b)	>2x background 2005: 78.2 / 2006: 130.9	Daughter product of organic chlorine	2	139	2	98.3	0
Hydrogen	>1 nM <1nM	Reductive pathway possible, VC may accumulate VC oxidized	3 0	NS		NS	
Volatile Fatty Acids	>0.1 mg/L	Intermediates resulting from biodegradation of organic compounds; carbon and energy source	2	NS		NS	
BTEX*	>0.1 mg/L (100 ug/L)	Carbon and energy source; drives dechlorination	2	ND	0	ND	0
PCE*		Material released	0	0.4	0	2	0
TCE*		Daughter product of PCE	2	1.6	2	2.4	2
DCE* ^(c)		Daughter product of TCE.	2	2.2	2	2.5	2
		If cis is greater than 80% of total DCE it is likely a daughter product of TCE; 1,1-DCE can be a chem. reaction product	0.7 190			1.5 173	
VC*		Daughter product of DCE	2	160	2	169	2
1,1,1-Trichloroethane*		Material released	0	0.3U	0	0.24U	0
DCA		Daughter product of TCA under reducing conditions	2	0.4U	0	0.7U	0
Carbon Tetrachloride		Material released	0	0.3U	0	0.3U	0
Chloroethane*		Daughter product of DCA or VC under reducing conditions	2	0.4U	0	0.33U	0
Ethene/Ethane	>0.01 mg/L	Daughter product of VC/ethene	2	0.25U 0.25U	0	0.00094 0.004	0
	>0.1 mg/L	Daughter product of VC/ethene	3		0		0
Chloroform		Daughter product of Carbon Tetrachloride	2	0.3U	0	0.19U	0
Dichloromethane		Daughter product of Chloroform	2	NS		NS	
Heterotroph Plate Count**		<500 CFU/ml is low range; 900-2000 CFU/ml is moderate; >10,000 CFU/ml is high		416		1500	

Notes:

* required analysis according to EPA Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater

Background of alkalinity and chloride used from MW-47 (NE site edge location) and MW42 (NW corner of site)

**Not part of the EPA screening process. A measurement conducted for additional information.

(a) Alkalinity background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background alkalinity: (257mg/L (MW42) + 256 mg/L (MW47))/2 = 256.5 mg/L. Twice background is 513 mg/L.

2006 determination of background alkalinity: (2*((241+318)/2)) = 559 mg/L

(b) Chloride 2xbackground calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background chloride (50.9 mg/L (MW42) + 27.3 mg/L (MW47))/2 = 39 mg/L. Twice background is 78.2 mg/L.

2006 determination of background chloride (2*((41.9+89)/2))=130.9 mg/L

(c) Data is listed in this order: trans1,2DCE, 1,1DCE, cis1,2DCE

(d) See Table 3A for specific data results where non-detect (ND) is listed above.

Natural Attenuation Screening Protocol RW13		Interpretation	Score	Score			
		Inadequate evidence for anaerobic biodegradation* of chlorinated	0 to 5	2005 1			2006 1
		Limited evidence for anaerobic biodegradation* of chlorinated	6 to 14				
		Adequate evidence for anaerobic biodegradation* of chlorinated	15 to 20	inadequate			inadequate
		Strong evidence for anaerobic biodegradation* of chlorinated	>20				
Concentration in Most Contam. Zone			Yes	2005		2006	
Analysis				Data	Points	Data (d)	Points
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at high concentrations	3	5.08	0	6.34	0
	> 5mg/L	Not tolerated; however, VC may be oxidized aerobically	-3		-3		-3
Nitrate*	<1 mg/L	At higher concentrations may compete with reductive pathway	2	NS		NS	
Iron II* (ferrous-soluble)	>1 mg/L	Reductive pathway possible; VC may be oxidized under Fe(III)-reducing conditions	3	NS		NS	
Sulfate*	<20 mg/L	At higher concentrations may compete with reductive pathway	2	NS		NS	
Sulfide*	>1 mg/L	Reductive pathway possible	3	NS		NS	
Methane*	>0.5 mg/L	Ultimate reductive daughter product, VC Accumulation (<0.5 VC oxidizes)	3	NS		NS	
Oxidation Reduction Potential* (ORP)	<50 millivolts (mV)	Reductive pathway possible	1	0	0	129	0
	<-100mV	Reductive pathway likely	2				
pH*	5 < pH < 9	Optimal range for reductive pathway	0	7.8	0	7.14	0
	5>pH>9	Outside optimal range for reductive pathway	-2				
TOC	>20 mg/L	Carbon and energy source; drives dechlorination; could be natural or anthropogenic	2	NS		NS	
Temperature*	>20°C	At T >20°C biochemical process is accelerated	1	19	0	19.38	0
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1	NS		NS	
Alkalinity ^(a)	>2x background 2005: 513 / 2006: 559	Results from interaction of carbon dioxide with aquifer minerals	1	NS		NS	
Chloride* ^(b)	>2x background 2005: 78.2 / 2006: 130.9	Daughter product of organic chlorine	2	NS		NS	
Hydrogen	>1 nM <1nM	Reductive pathway possible, VC may accumulate if VC oxidized	3 0	NS		NS	
Volatile Fatty Acids	>0.1 mg/L	Intermediates resulting from biodegradation of aromatic compounds; carbon and energy source	2	NS		NS	
BTEX*	>0.1 mg/L (100 ug/L)	Carbon and energy source; drives dechlorination	2	ND	0	ND	0
PCE*		Material released	0	1.8	0	1.5	0
TCE*		Daughter product of PCE	2	0.6	2	0.39	2
DCE* ^(c)		Daughter product of TCE.	2	0.4U	0	1U	0
		If cis is greater than 80% of total DCE it is likely a daughter product of TCE; 1,1-DCE can be a chem. reaction product of DCE	1.9			4.2	
			0.4U			1U	
VC*		Daughter product of DCE	2	0.3U	0	1U	0
1,1,1-Trichloroethane*		Material released	0	4.8	0	17.4	0
DCA		Daughter product of TCA under reducing conditions	2	1.4	2	3.1	2
Carbon Tetrachloride		Material released	0	0.3U	0	1U	0
Chloroethane*		Daughter product of DCA or VC under reducing conditions	2	0.2U	0	1U	0
Ethene/Ethane	>0.01 mg/L	Daughter product of VC/ethene	2	NS		NS	
	>0.1 mg/L	Daughter product of VC/ethene	3	NS		NS	
Chloroform		Daughter product of Carbon Tetrachloride	2	0.4U	0	1U	0
Dichloromethane		Daughter product of Chloroform	2	NS		NS	
Heterotroph Plate Count**		<500 CFU/ml is low range; 900-2000 CFU/ml is moderate; >10,000 CFU/ml is high		NS		NS	

Notes:

Geochemical data was not obtained for 2005 or 2006 in addition to field parameters (ie, pH, ORP, DO)

* required analysis according to EPA Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater

Background of alkalinity and chloride used from MW-47 (NE site edge location) and MW42 (NW corner of site)

**Not part of the EPA screening process. A measurement conducted for additional information.

(a) Alkalinity background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background alkalinity: (257mg/L (MW42) + 256 mg/L (MW47))/2 = 256.5 mg/L. Twice background is 513 mg/L.

2006 determination of background alkalinity: (2*((241+318)/2)) = 559 mg/L

(b) Chloride 2xbackground calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background chloride (50.9 mg/L (MW42) + 27.3 mg/L (MW47))/2 = 39 mg/L. Twice background is 78.2 mg/L.

2006 determination of background chloride (2*((41.9+89)/2))=130.9 mg/L

(c) Data is listed in this order: trans-1,2-DCE, 1,1-DCE, cis-1,2-DCE

(d) See Table 3A for specific data results where non-detect (ND) is listed above.

Natural Attenuation Screening Protocol		Interpretation	Score	Score			
		Inadequate evidence for anaerobic biodegradation* of chlorinated solvents	0 to 5	2005 27	strong	2006 23	strong
		Limited evidence for anaerobic biodegradation* of chlorinated solvents	6 to 14				
RW16		Adequate evidence for anaerobic biodegradation* of chlorinated solvents	15 to 20				
		Strong evidence for anaerobic biodegradation* of chlorinated solvents	>20				
Concentration in Most Contam. Zone			Yes	2005 Data	2005 Points	2006 Data(e)	2006 Points
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at high concentrations	3	3.21	0	2.02	0
	> 5mg/L	Not tolerated; however, VC may be oxidized aerobically	-3		0		0
Nitrate*	<1 mg/L	At higher concentrations may compete with reductive pathway	2	0.1U	2	0.11U	2
Iron II* (ferrous-soluble)	>1 mg/L	Reductive pathway possible; VC may be oxidized to Fe(III)-reducing conditions	3	4.6	3	2	3
Sulfate*	<20 mg/L	At higher concentrations may compete with reductive pathway	2	5U	2	2U	0
Sulfide*	>1 mg/L	Reductive pathway possible	3	1U	0	2U	0
Methane*	>0.5 mg/L	Ultimate reductive daughter product, VC Accumulation (<0.5 VC oxidizes)	3	3	3	8.54	3
Oxidation Reduction Potential* (ORP)	<50 millivolts (mV)	Reductive pathway possible	1	-197	1	-148	1
	<-100mV	Reductive pathway likely	2		2		2
pH*	5 < pH < 9 5>pH>9	Optimal range for reductive pathway Outside optimal range for reductive pathway	0 -2	6.93	0	6.78	0
TOC	>20 mg/L	Carbon and energy source; drives dechlorination; natural or anthropogenic	2	NS		NS	
Temperature*	>20°C	At T >20°C biochemical process is accelerated	1	16.33	0	17.42	0
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1	NS		NS	
Alkalinity ^(a)	>2x background 2005: 513 / 2006: 559	Results from interaction of carbon dioxide with aquifer minerals	1	480	0	449	0
Chloride* ^(b)	>2x background 2005: 78.2 / 2006: 130.9	Daughter product of organic chlorine	2	82.9	2	245	2
Hydrogen	>1 nM <1nM	Reductive pathway possible, VC may accumulate VC oxidized	3 0	NS		NS	
Volatile Fatty Acids	>0.1 mg/L	Intermediates resulting from biodegradation of organic compounds; carbon and energy source	2	NS		NS	
BTEX*	>0.1 mg/L (100 ug/L)	Carbon and energy source; drives dechlorination	2	ND	0	trace levels 0.23, 0.5J ug/L	0
PCE*		Material released	0	1.8U	0	0.28U	0
TCE*		Daughter product of PCE	2	9.6	2	0.49J	0
DCE* ^(c)		Daughter product of TCE. If cis is greater than 80% of total DCE it is likely a daughter product of TCE; 1,1-DCE can be a chem. reaction product	2 24 16	1.6U 24 16	2	0.38U 4.4 0.56U	2
VC* ^(d)		Daughter product of DCE	2	24	2	12.7	2
1,1,1-Trichloroethane*		Material released	0	160	0	7.1	0
DCA		Daughter product of TCA under reducing conditions	2	340	2	92.6	2
Carbon Tetrachloride		Material released	0	1.5U	0	0.3U	0
Chloroethane*		Daughter product of DCA or VC under reducing conditions	2	1100	2	1260	2
Ethene/Ethane	>0.01 mg/L	Daughter product of VC/ethene	2	0.12U 0.12U	2	0.0028 0.0201	2
	>0.1 mg/L	Daughter product of VC/ethene	3		0		0
Chloroform		Daughter product of Carbon Tetrachloride	2	1.7U	0	0.19U	0
Dichloromethane		Daughter product of Chloroform	2	NS	0	NS	
Heterotroph Plate Count**		<500 CFU/ml is low range; 900-2000 CFU/ml is moderate; >10,000 CFU/ml is high		529		2900	

Notes:

* required analysis according to EPA Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater
Background of alkalinity and chloride used from MW-47 (NE site edge location) and MW42 (NW corner of site)

**Not part of the EPA screening process. A measurement conducted for additional information.

(a) Alkalinity background calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background alkalinity: (257mg/L (MW42) + 256 mg/L (MW47))/2 = 256.5 mg/L. Twice background is 513 mg/L.

2006 determination of background alkalinity: (2*((241+318)/2)) = 559 mg/L

(b) Chloride 2xbackground calculation. Background is average of the concentrations from MW42 and MW47.

2005 determination of background chloride (50.9 mg/L (MW42) + 27.3 mg/L (MW47))/2 = 39 mg/L. Twice background is 78.2 mg/L.

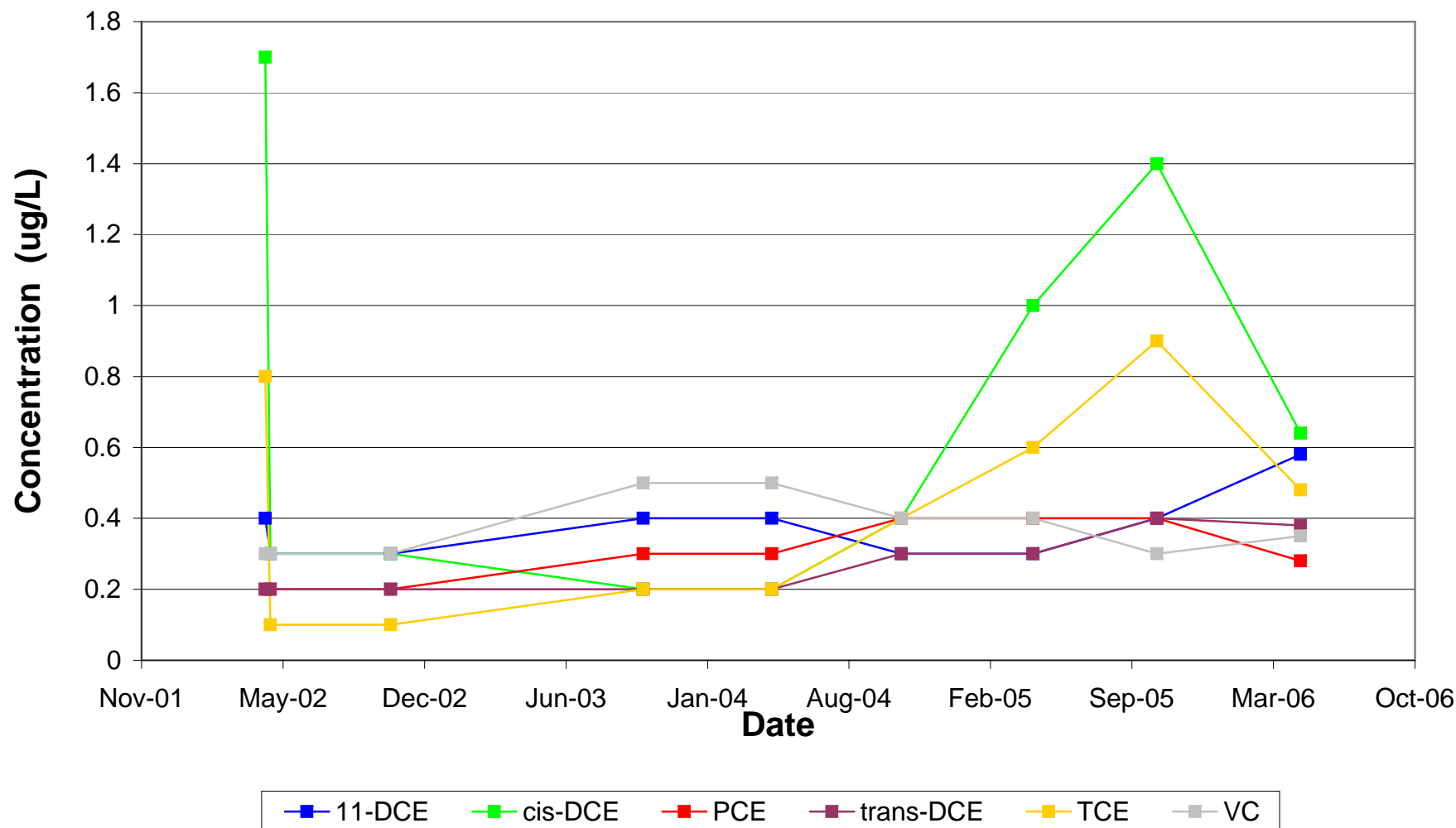
2006 determination of background chloride (2*((41.9+89)/2))=130.9 mg/L

(c) Data is listed in this order: trans1,2DCE, 1,1DCE, cis1,2DCE

(d) 1,2DCA present at high values. VC most likely degradation product of 1,2DCA

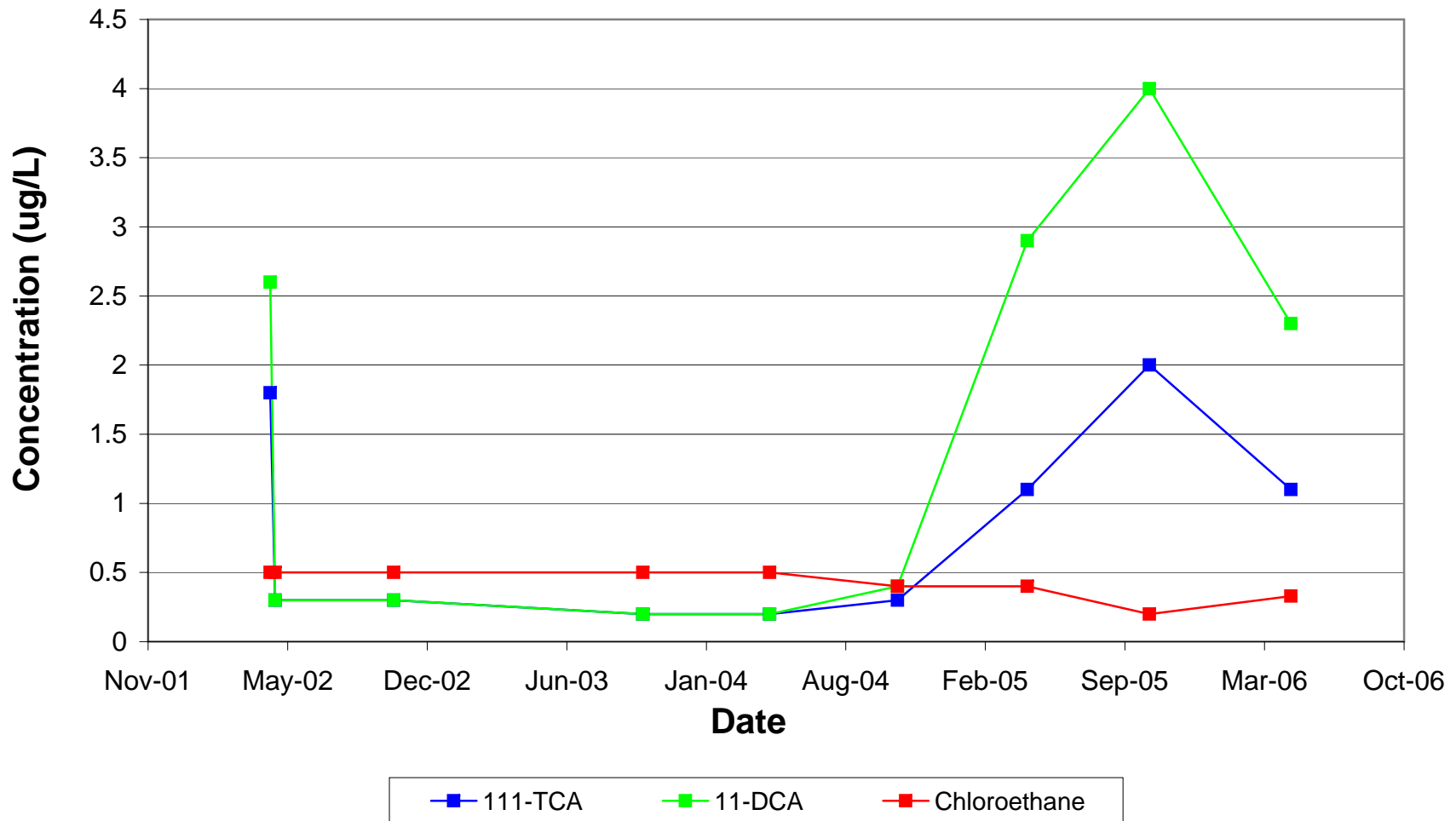
(e) See Table 3A for specific data results where non-detect (ND) is listed above.

MW3
PCE, TCE, DCE, VC- 2002 - 2006
Concentration vs. Time



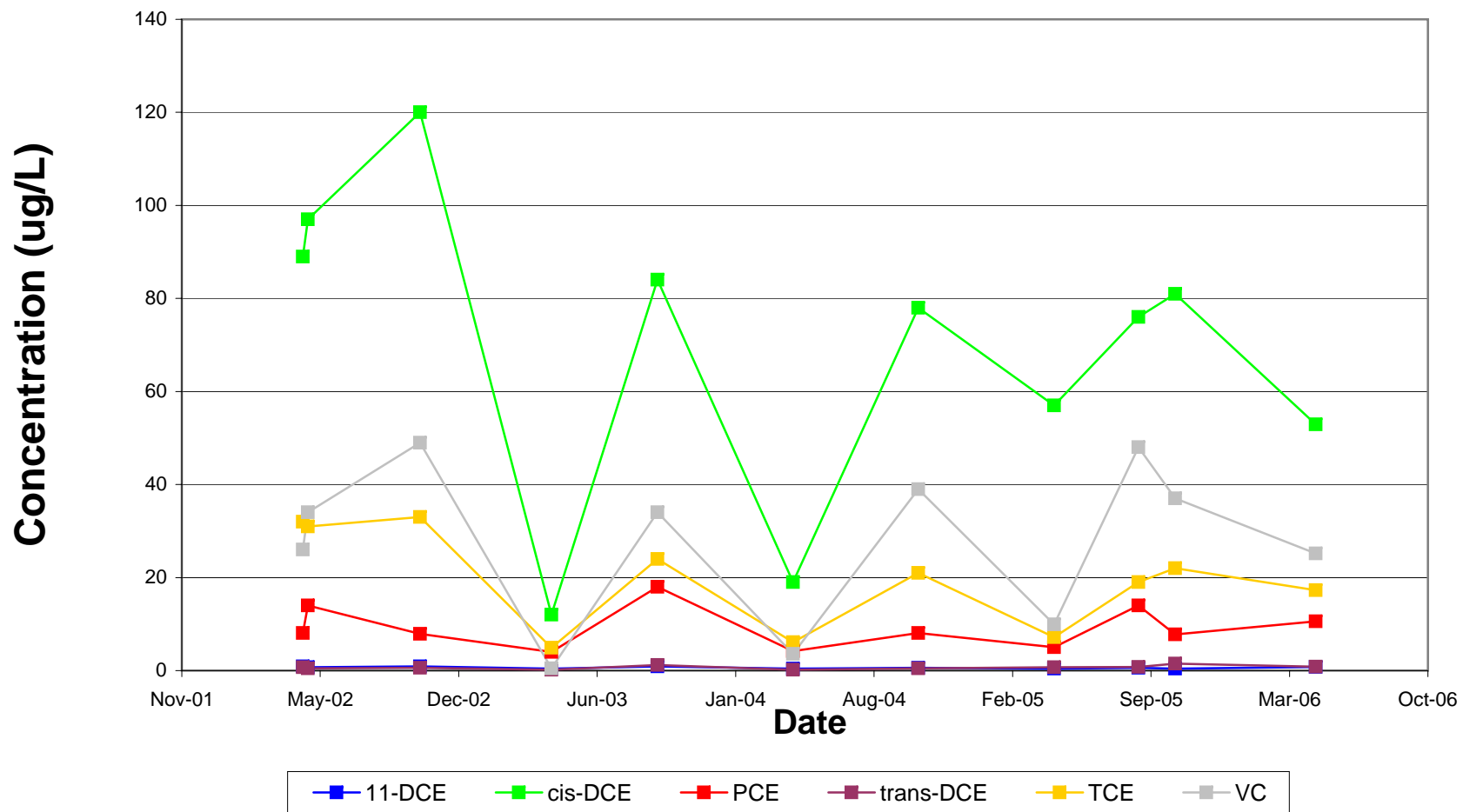
Note: The maximum concentration over the various depths was graphed.

MW3
111TCA, 11DCA, CA - 2002-2006
Concentration vs. Time



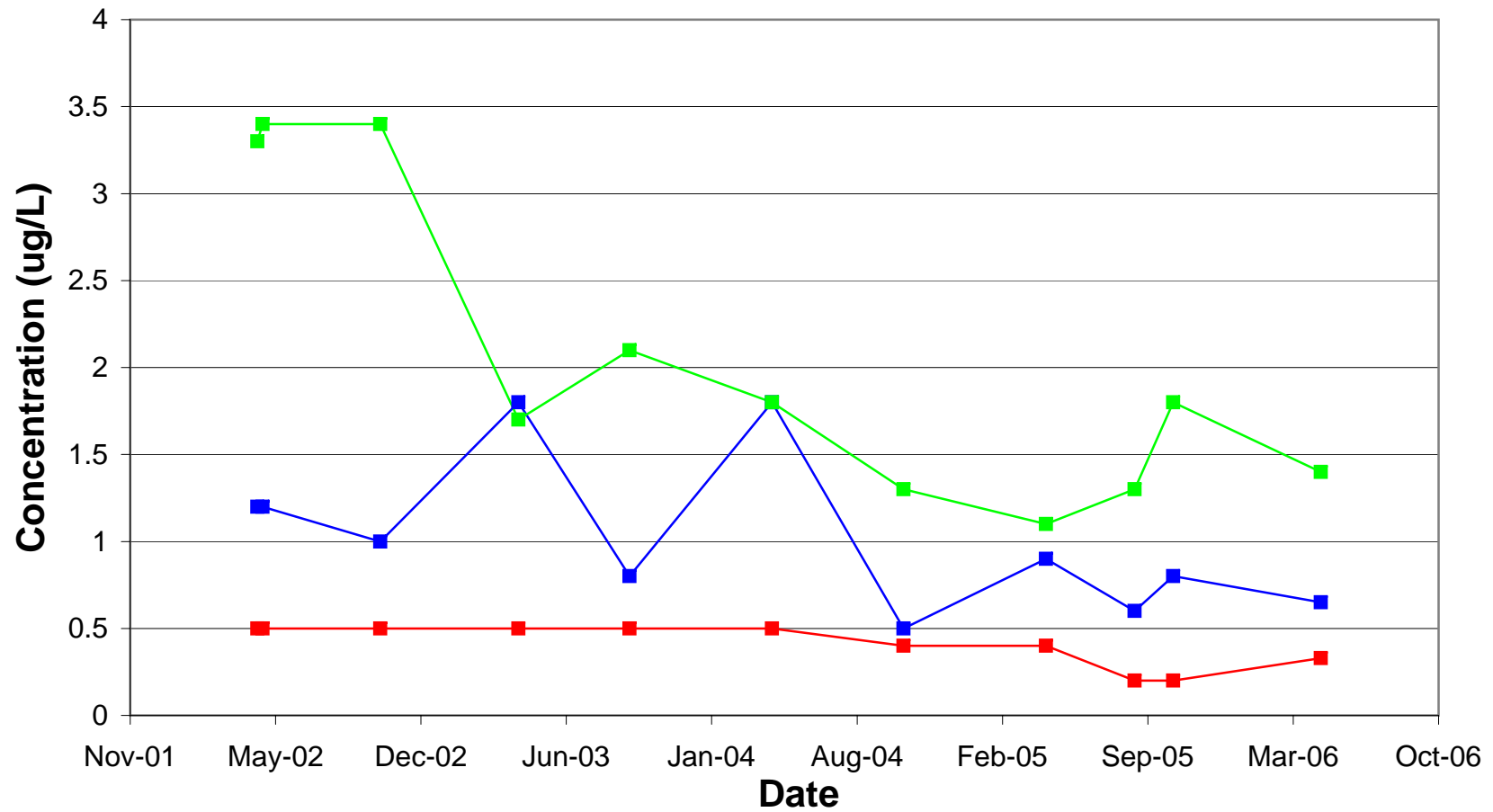
Note: The maximum concentration over the various depths was graphed.

MW4
PCE, TCE, DCE, VC -2002 - 2006
Concentration vs. Time



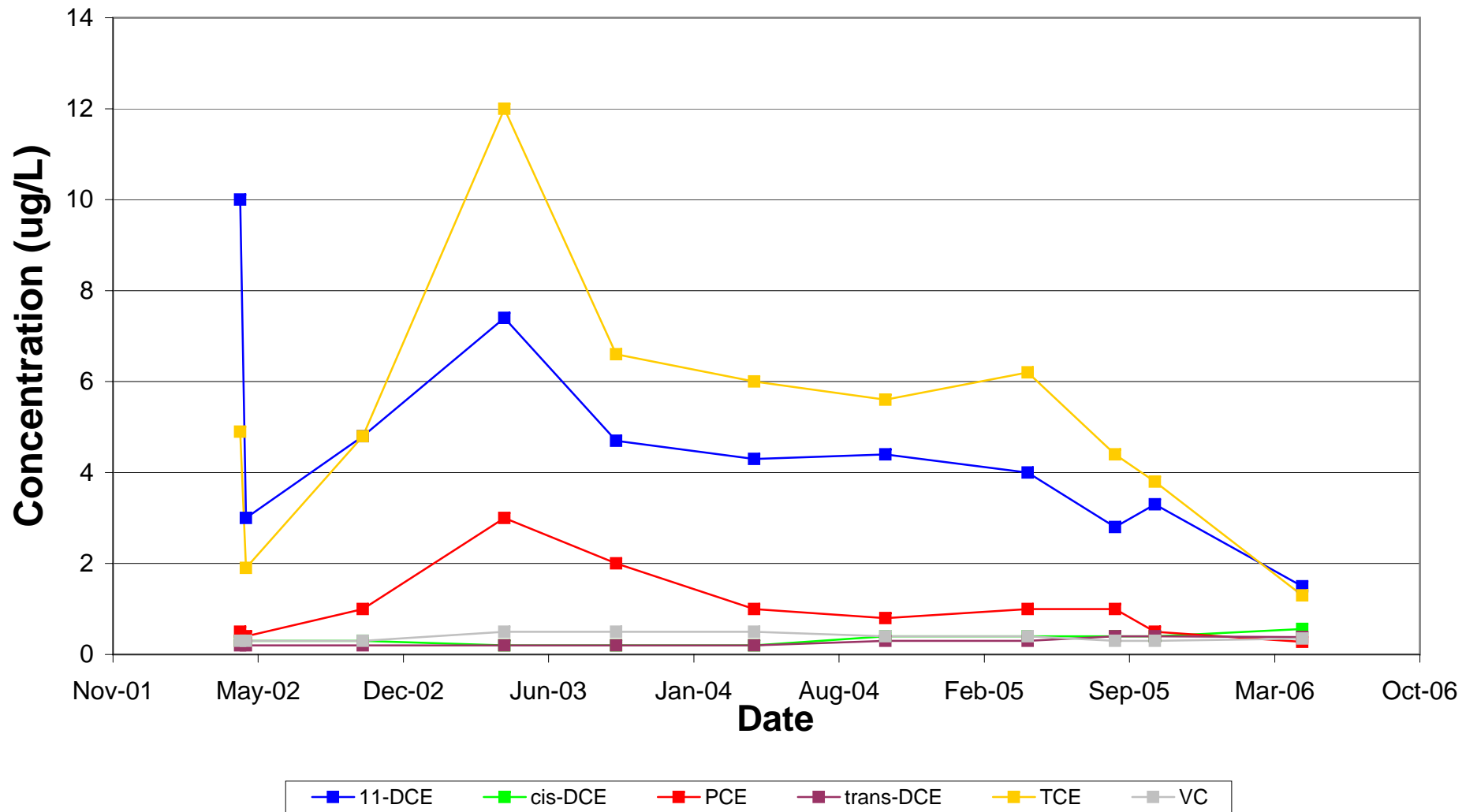
Note: The maximum concentration over the various depths was graphed.

MW4
111TCA, 11DCA, CA - 2002-2006
Concentration vs. Time



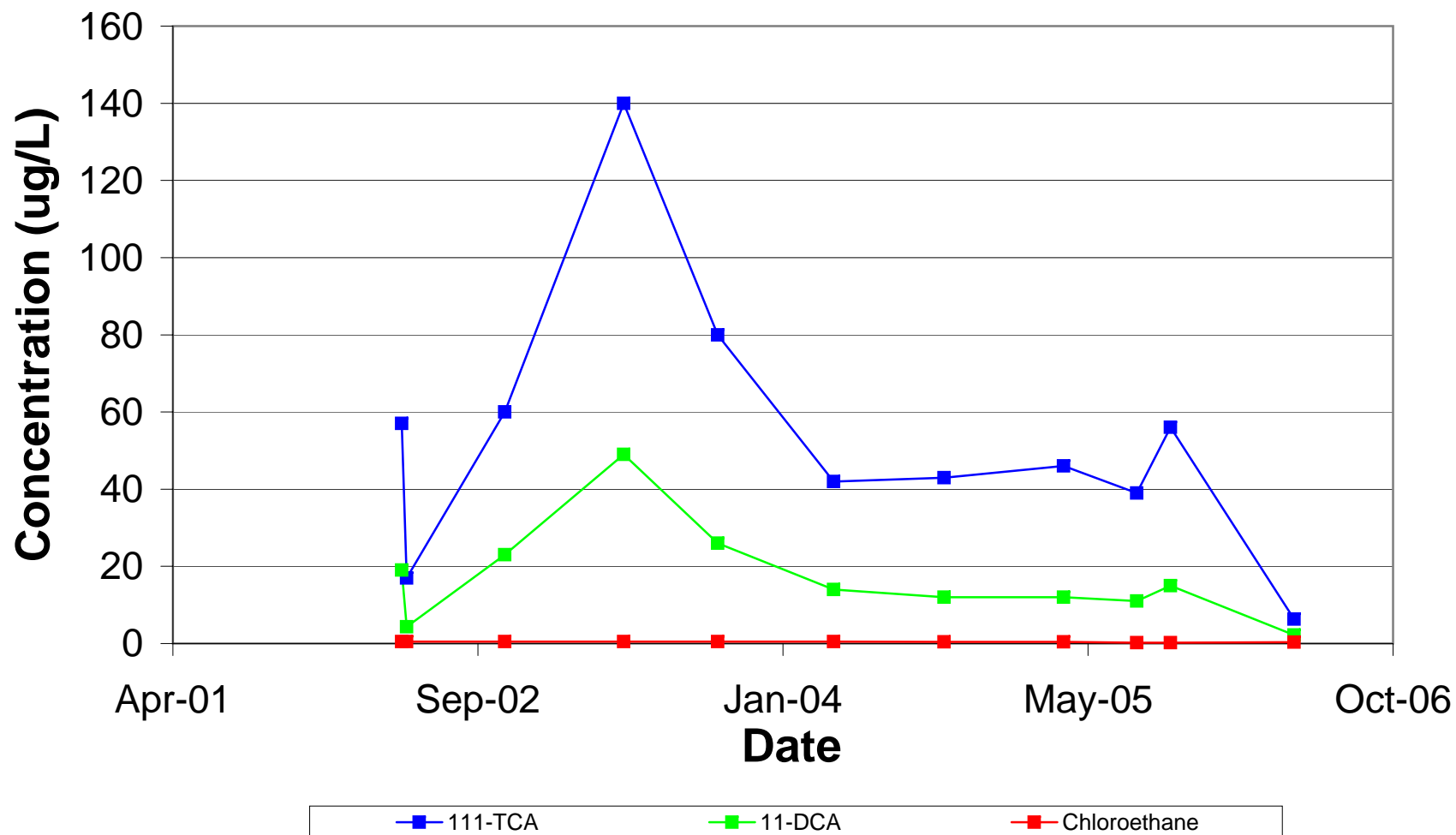
Note: The maximum concentration over the various depths was graphed.

MW6
PCE, TCE, DCE, VC - 2002-2006
Concentration vs. Time



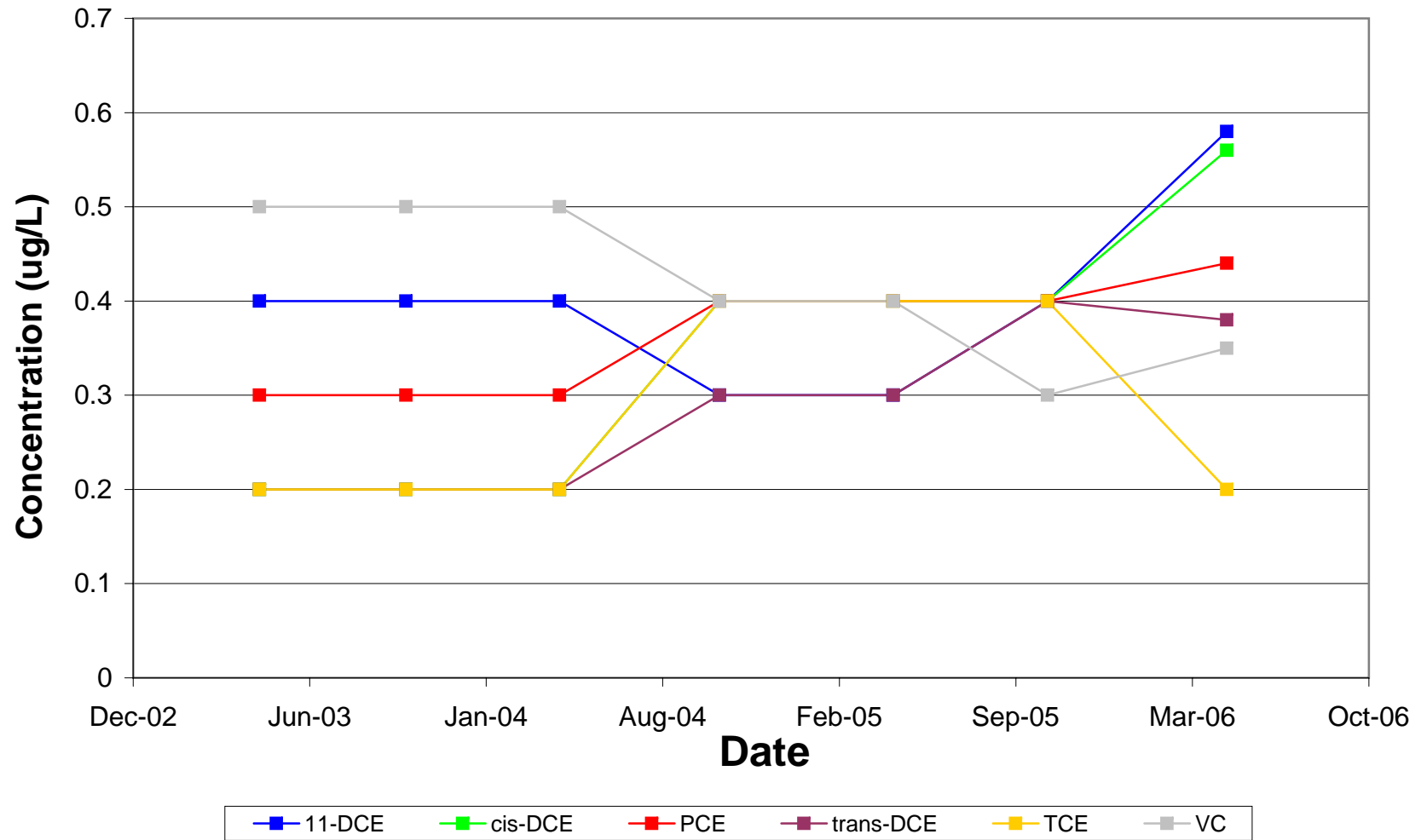
Note: The maximum concentration over the various depths was graphed.

MW6
111TCA, DCA, CA - 2002-2006
Concentration vs. Time



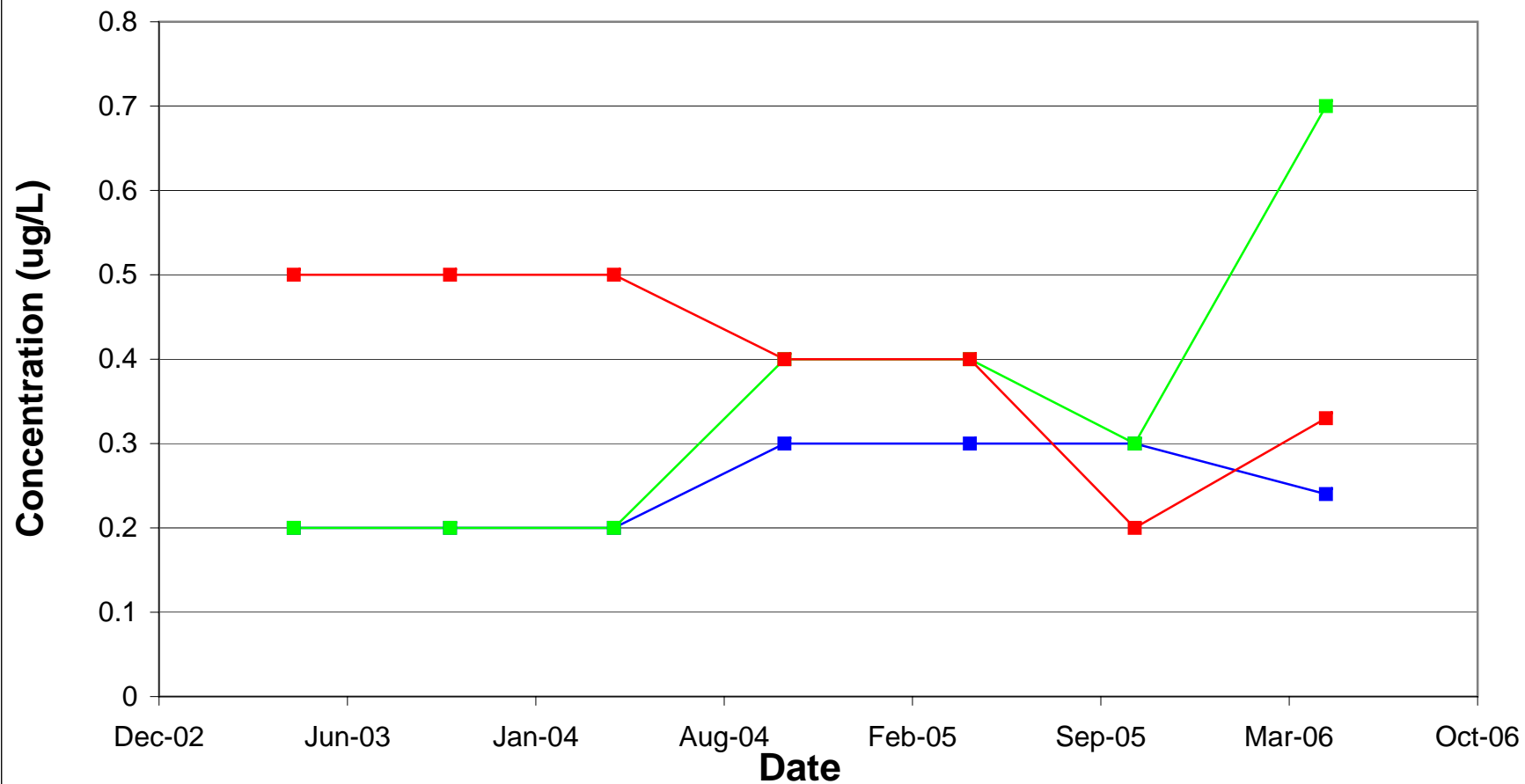
Note: The maximum concentration over the various depths was graphed.

MW12
PCE, TCE, DCE, VC - 2002-2006
Concentration vs. Time



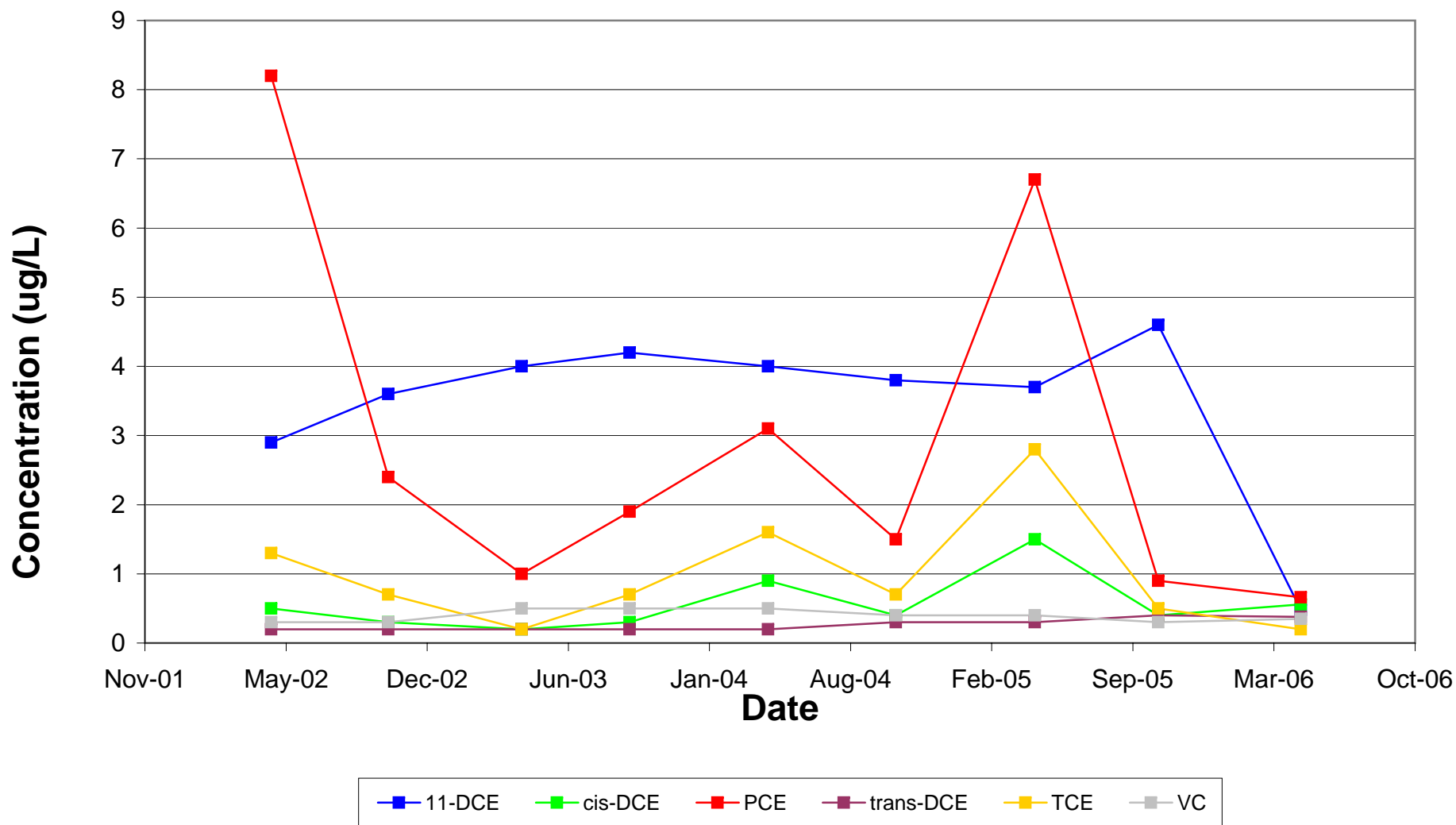
Note: The maximum concentration over the various depths was graphed.

MW12
111TCA, DCA, CA - 2002-2006
Concentration vs. Time



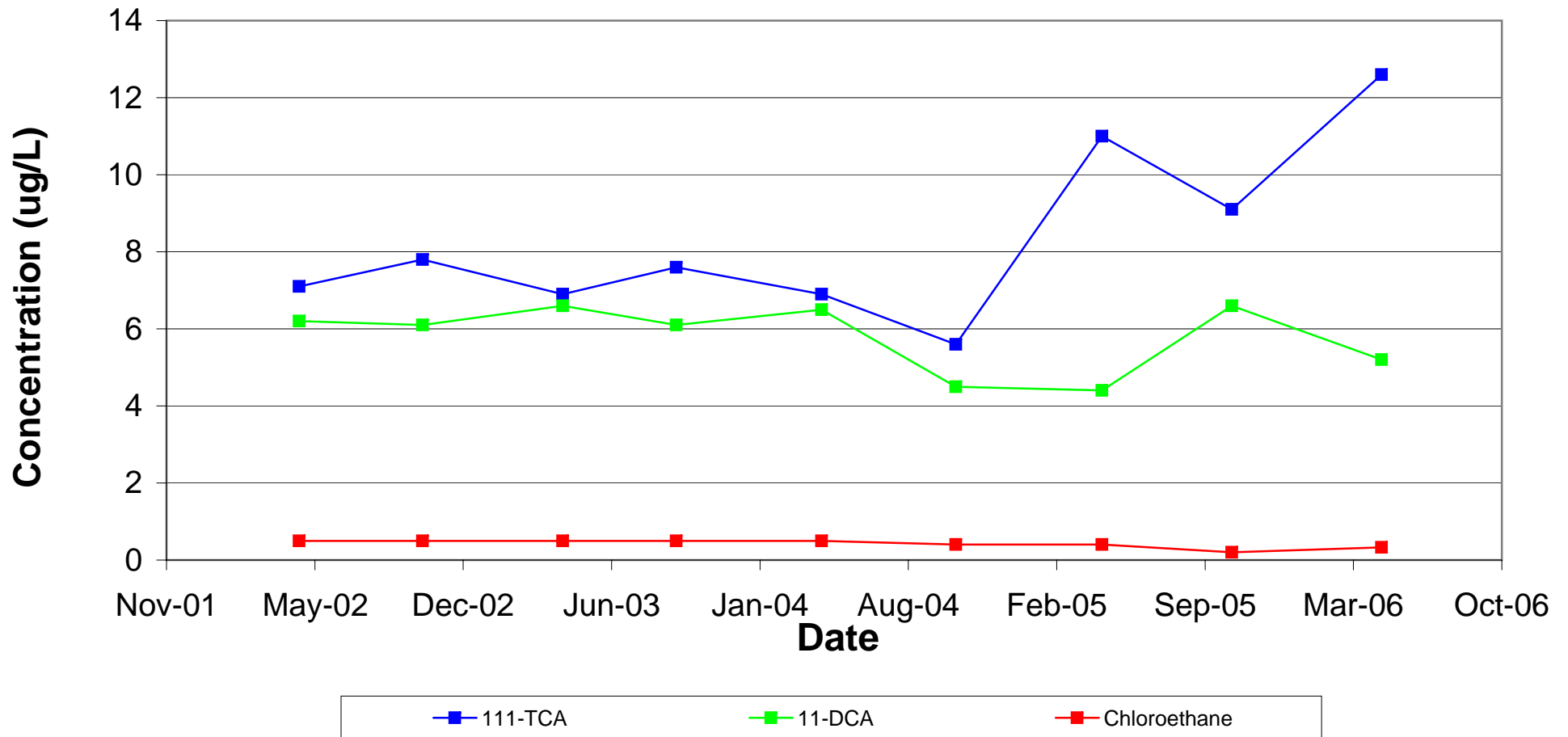
Note: The maximum concentration over the various depths was graphed.

MW16
PCE, TCE, DCE, VC - 2002-2006
Concentration vs. Time



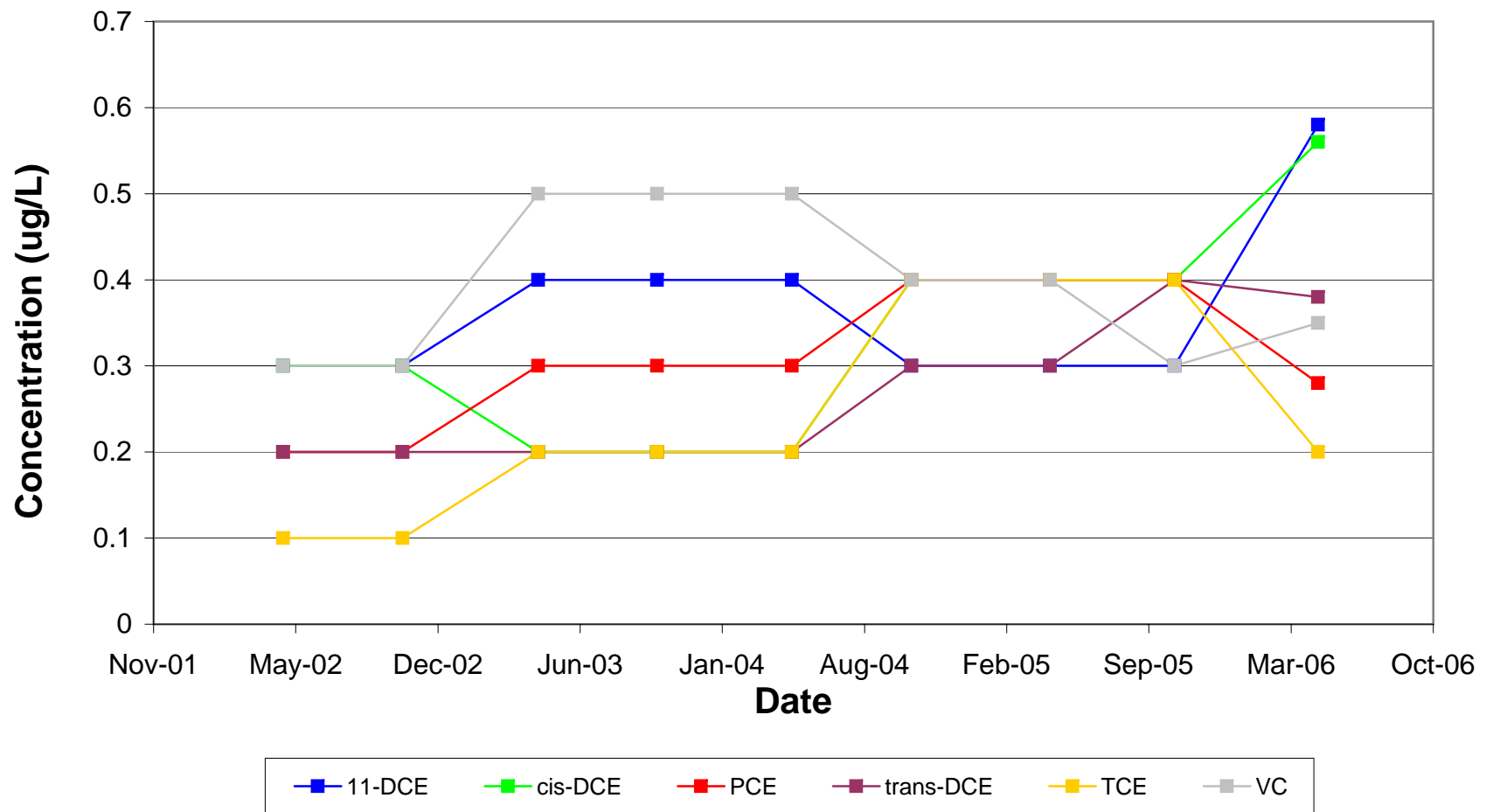
Note: The maximum concentration over the various depths was graphed.

MW16
111TCA, 11DCA, CA - 2002-2006
Concentration vs. Time



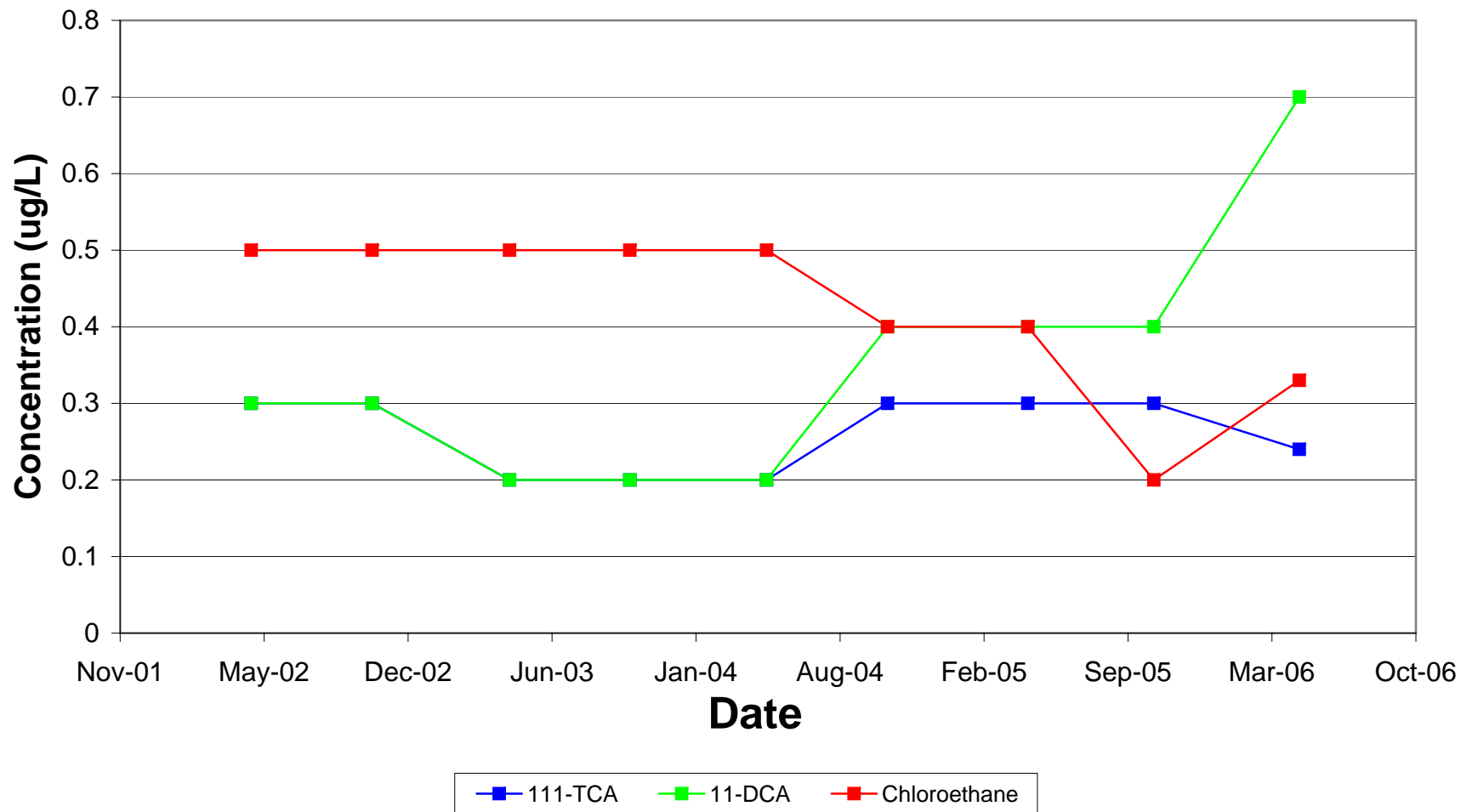
Note: The maximum concentration over the various depths was graphed.

MW18
PCE, TCE, DCE, VC - 2002-2006
Concentration vs. Time



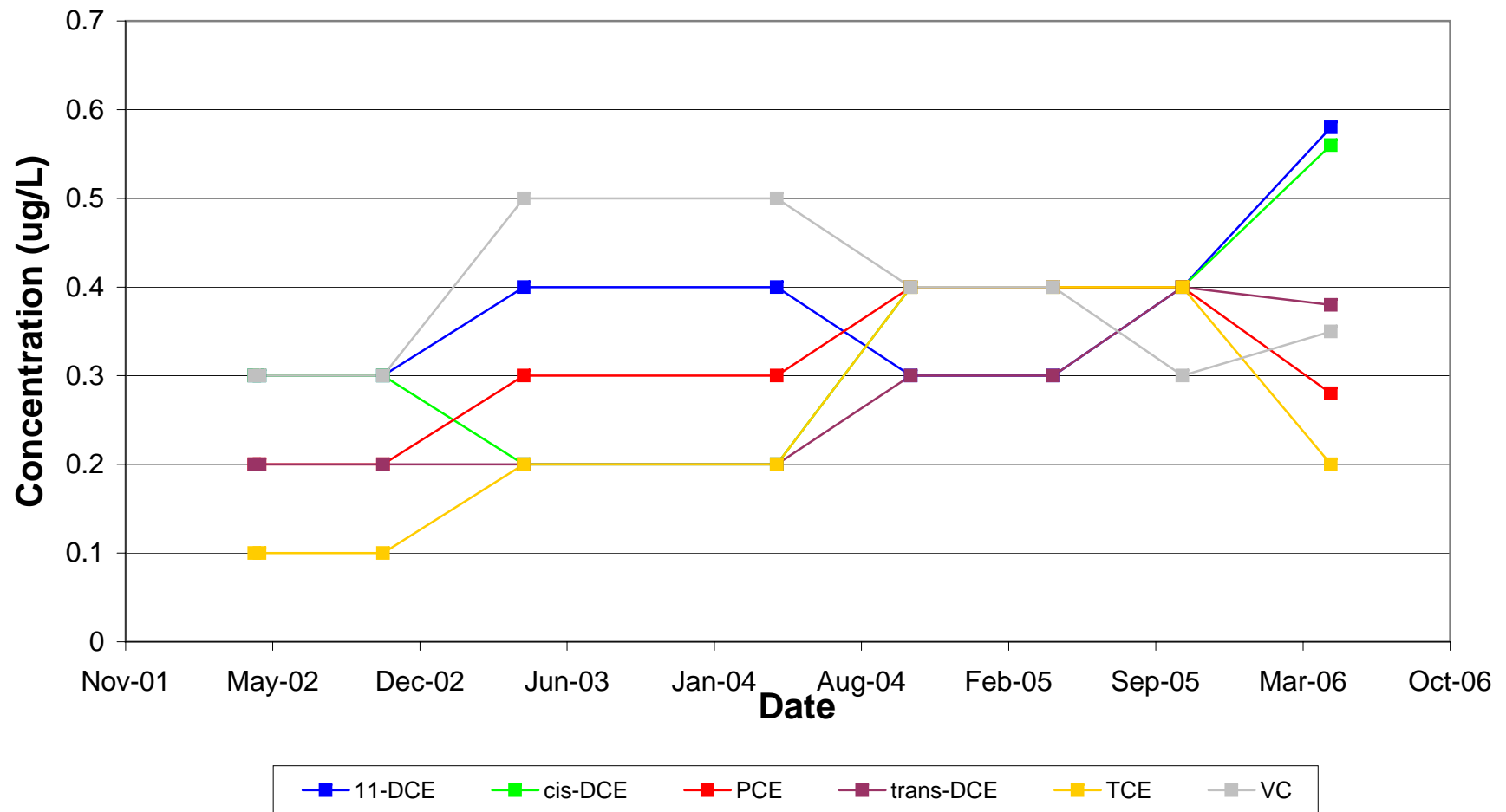
Note: The maximum concentration over the various depths was graphed.

MW18
111TCA, DCA, CA - 2002-2006
Concentration vs. Time



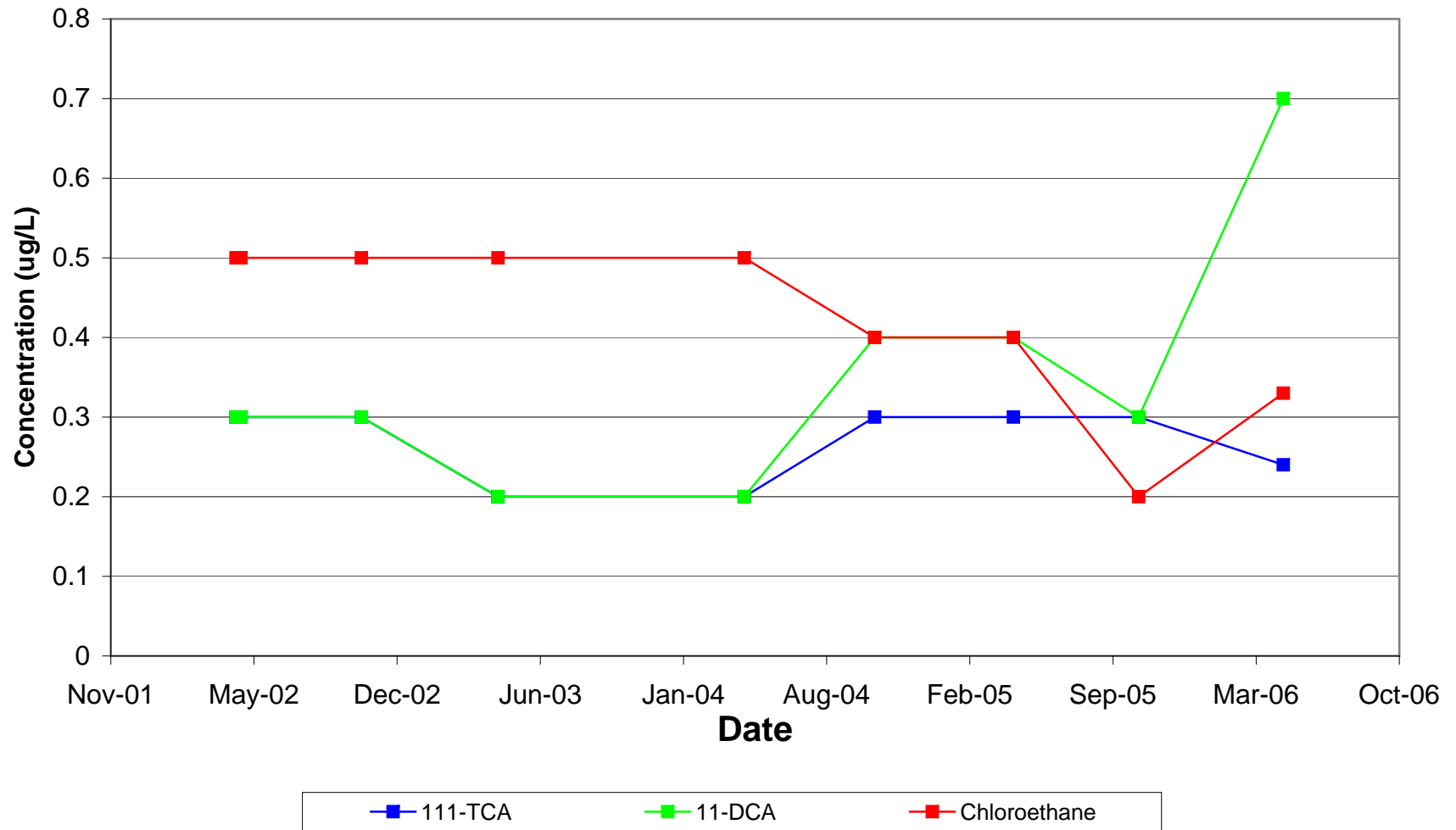
Note: The maximum concentration over the various depths was graphed.

MW20
PCE, TCE, DCE, VC - 2002-2006
Concentration vs. Time



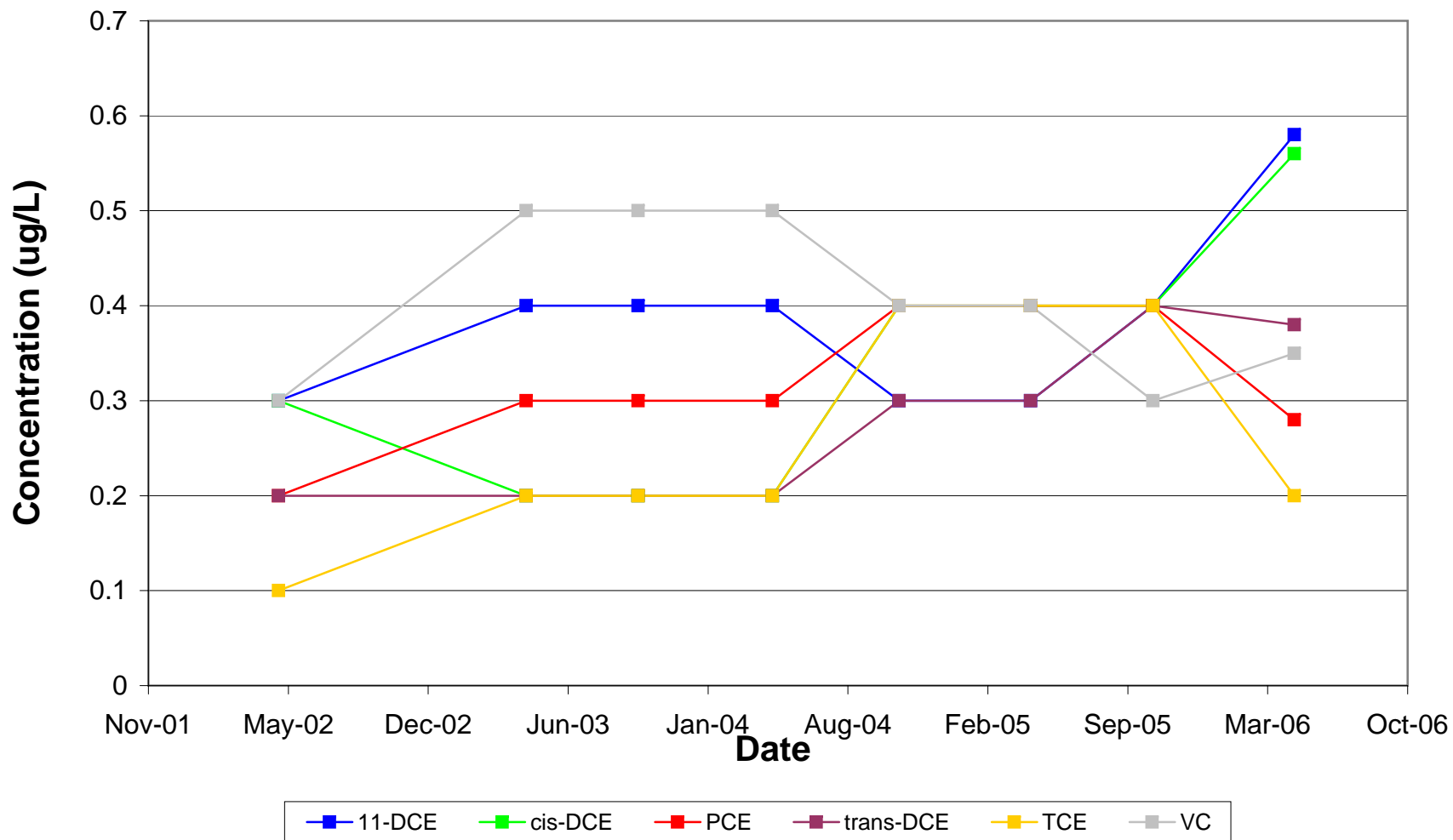
Note: The maximum concentration over the various depths was graphed.

MW20
111TCA, 11DCA, CA - 2002-2006
Concentration vs. Time



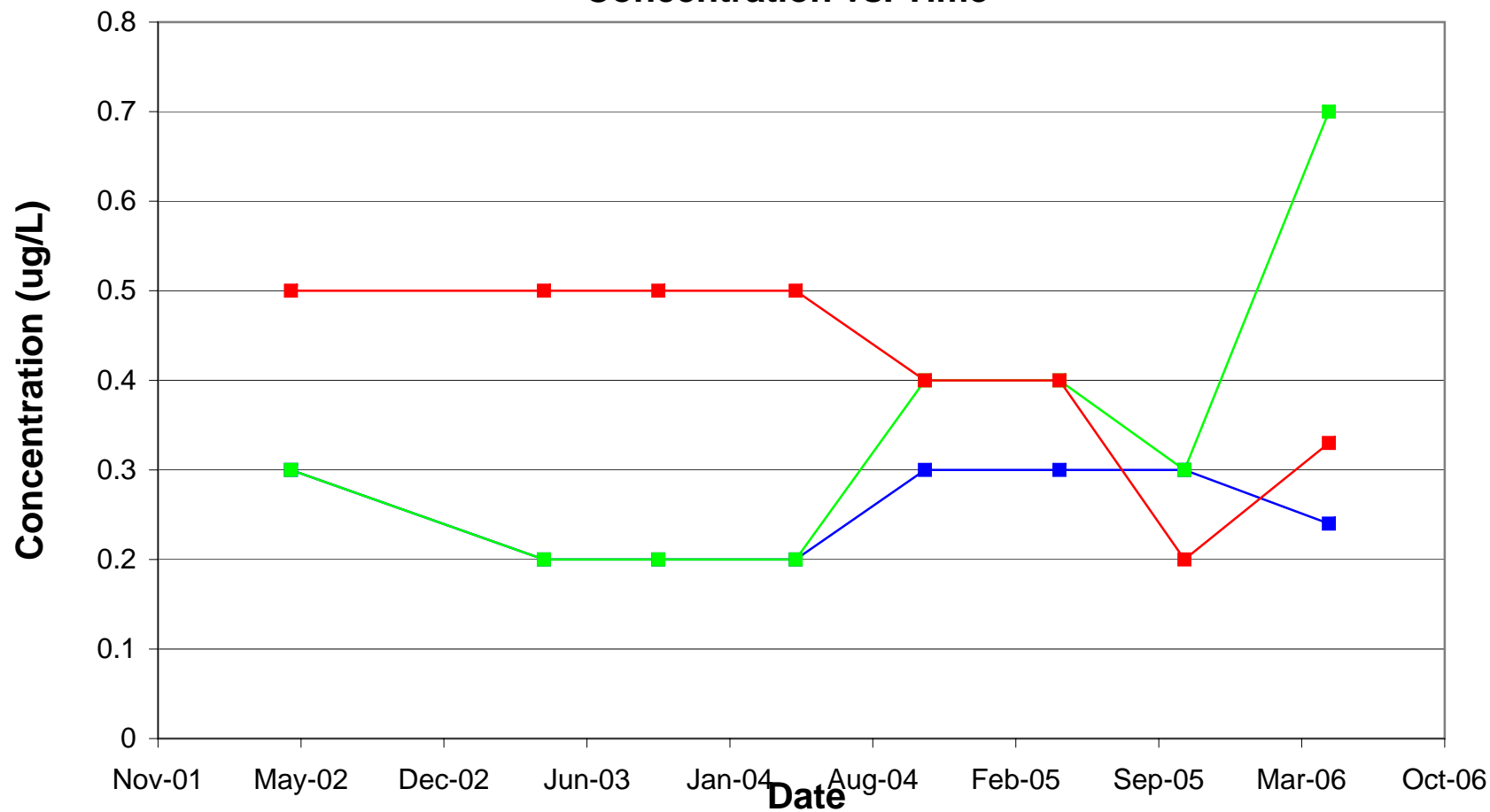
Note: The maximum concentration over the various depths was graphed.

MW30
PCE, TCE, DCE, VC - 2002-2006
Concentration vs. Time



Note: The maximum concentration over the various depths was graphed.

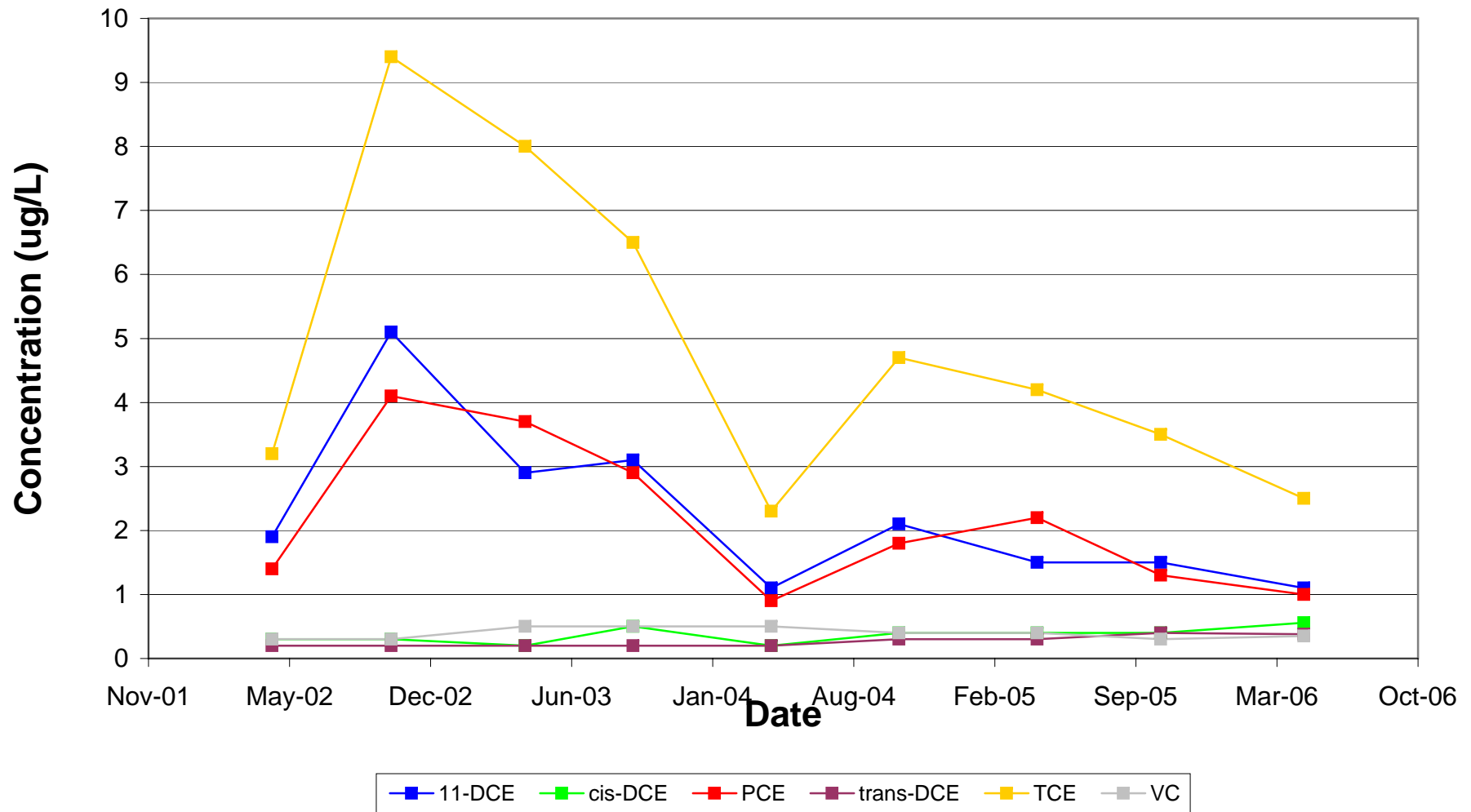
MW30
111TCA, 11DCA, CA - 2002-2006
Concentration vs. Time



—■— 111-TCA —■— 11-DCA —■— Chloroethane

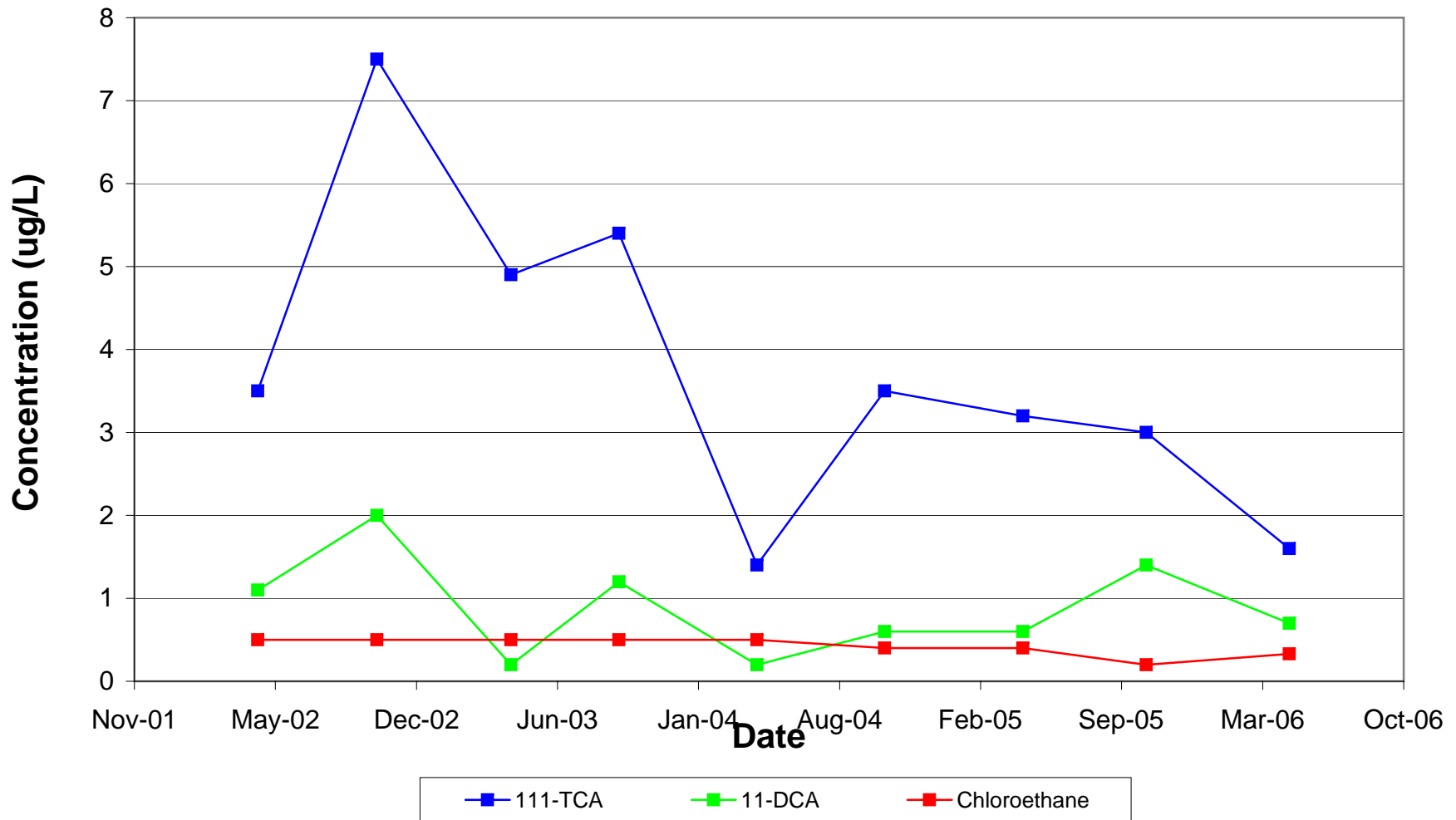
Note: The maximum concentration over the various depths was graphed.

MW33A
PCE, TCE, DCE, VC - 2002-2006
Concentration vs. Time



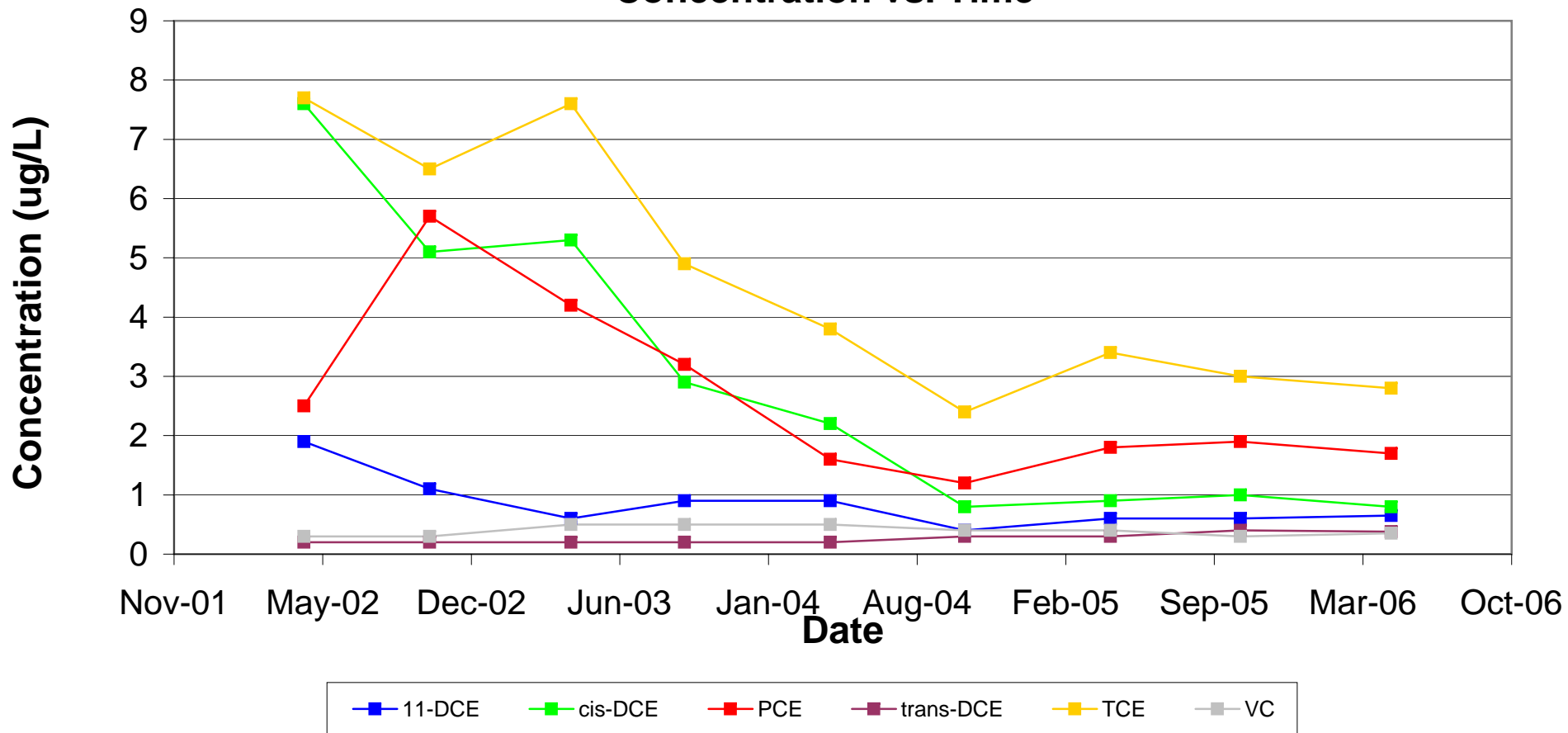
Note: The maximum concentration over the various depths was graphed.

MW33A
111TCA, DCA, CA - 2002-2006
Concentration vs. Time



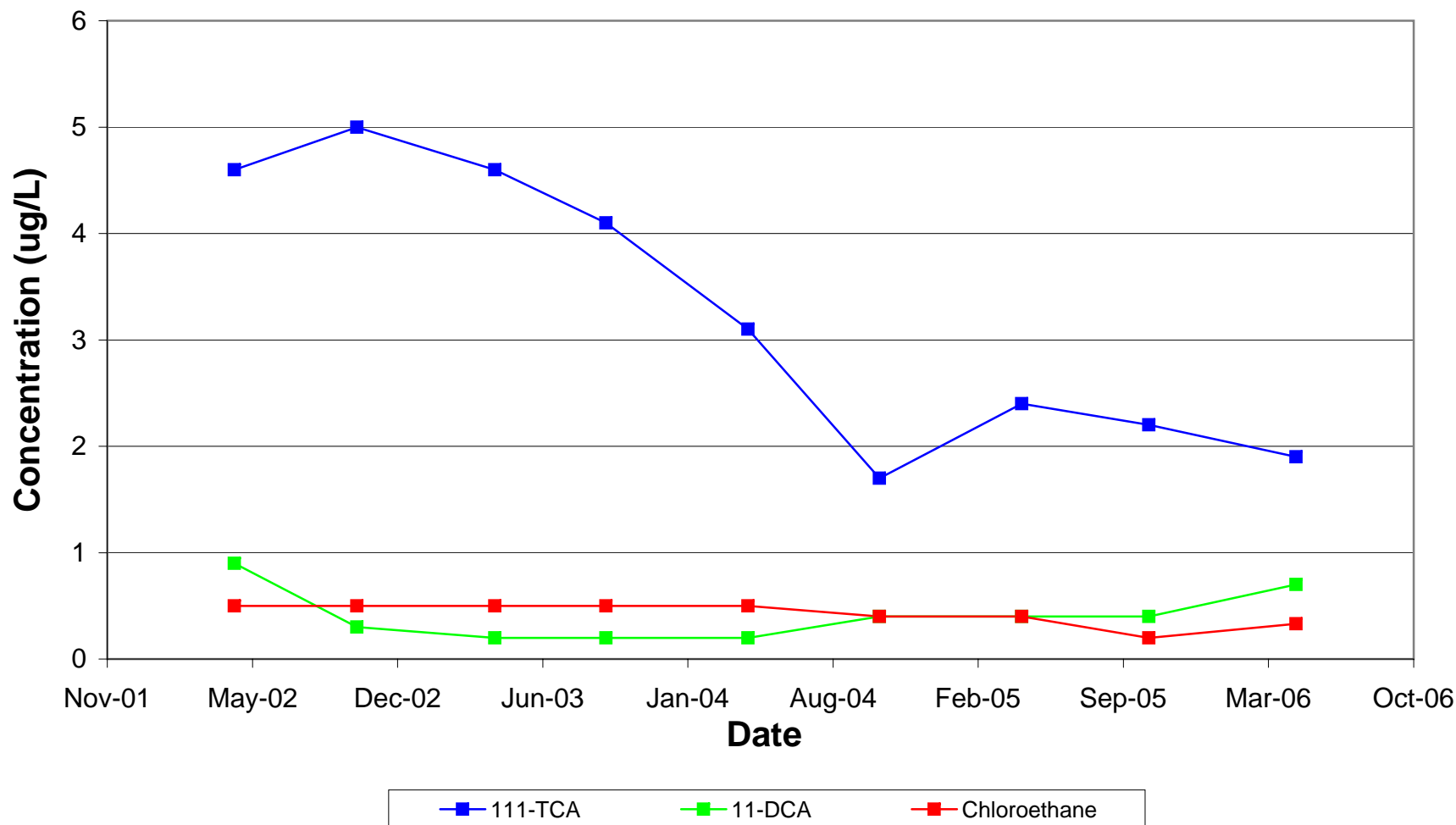
Note: The maximum concentration over the various depths was graphed.

MW34
PCE, TCE, DCE, VC - 2002-2006
Concentration vs. Time



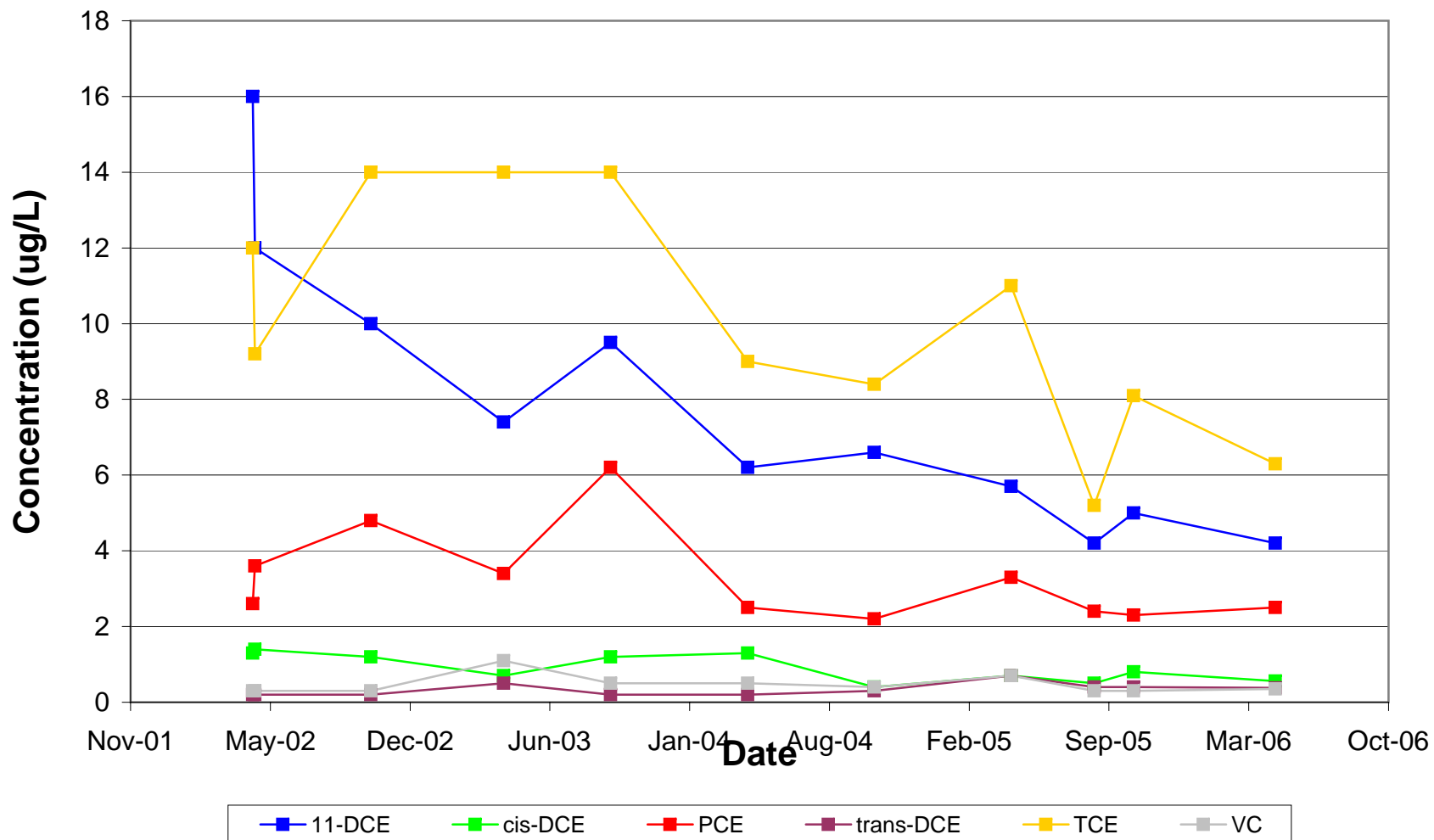
Note: The maximum concentration over the various depths was graphed.

MW34
TCA, DCA, CA - 2002-2006
Concentration vs. Time



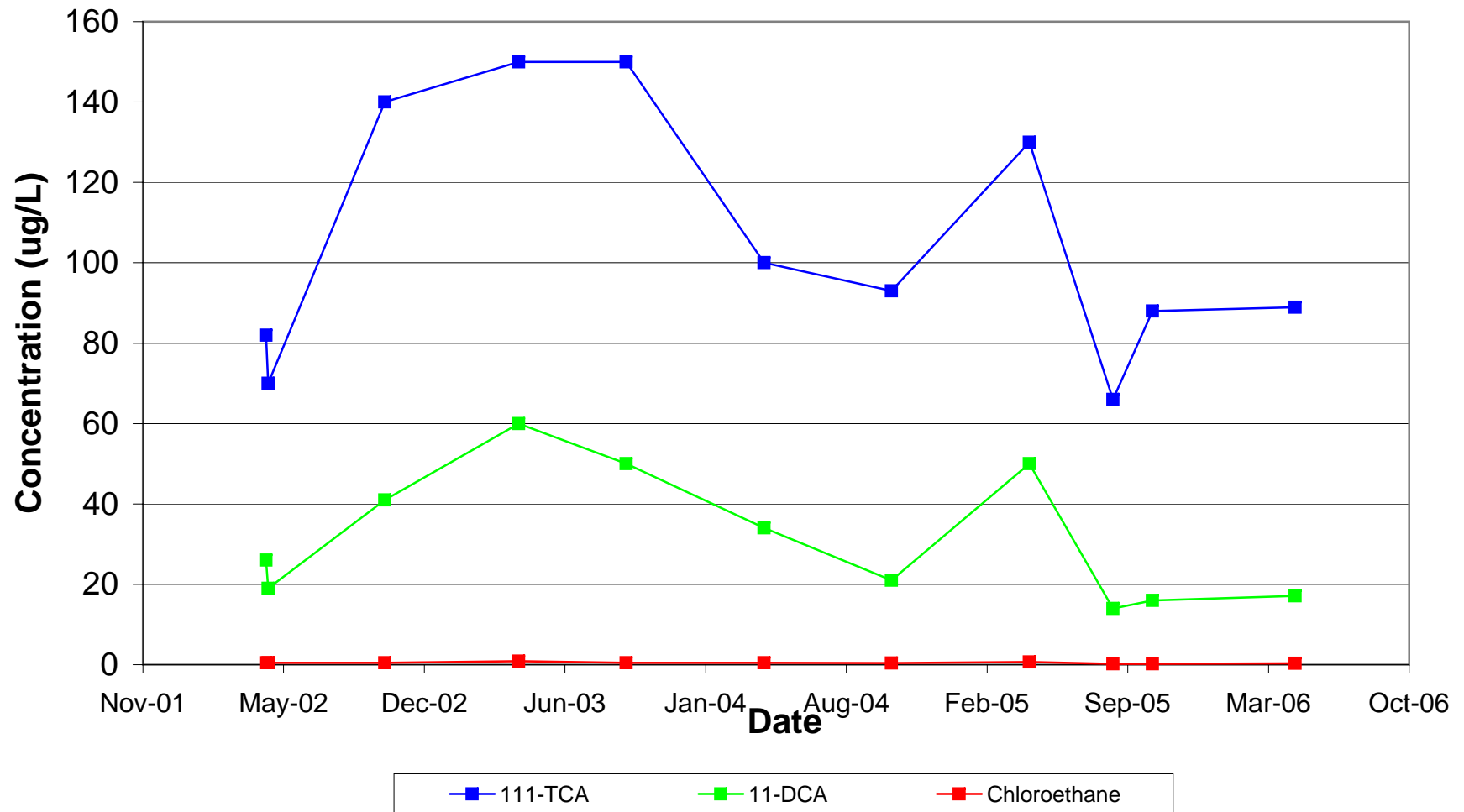
Note: The maximum concentration over the various depths was graphed.

MW35
PCE, TCE, DCE, VC - 2002-2006
Concentration vs. Time



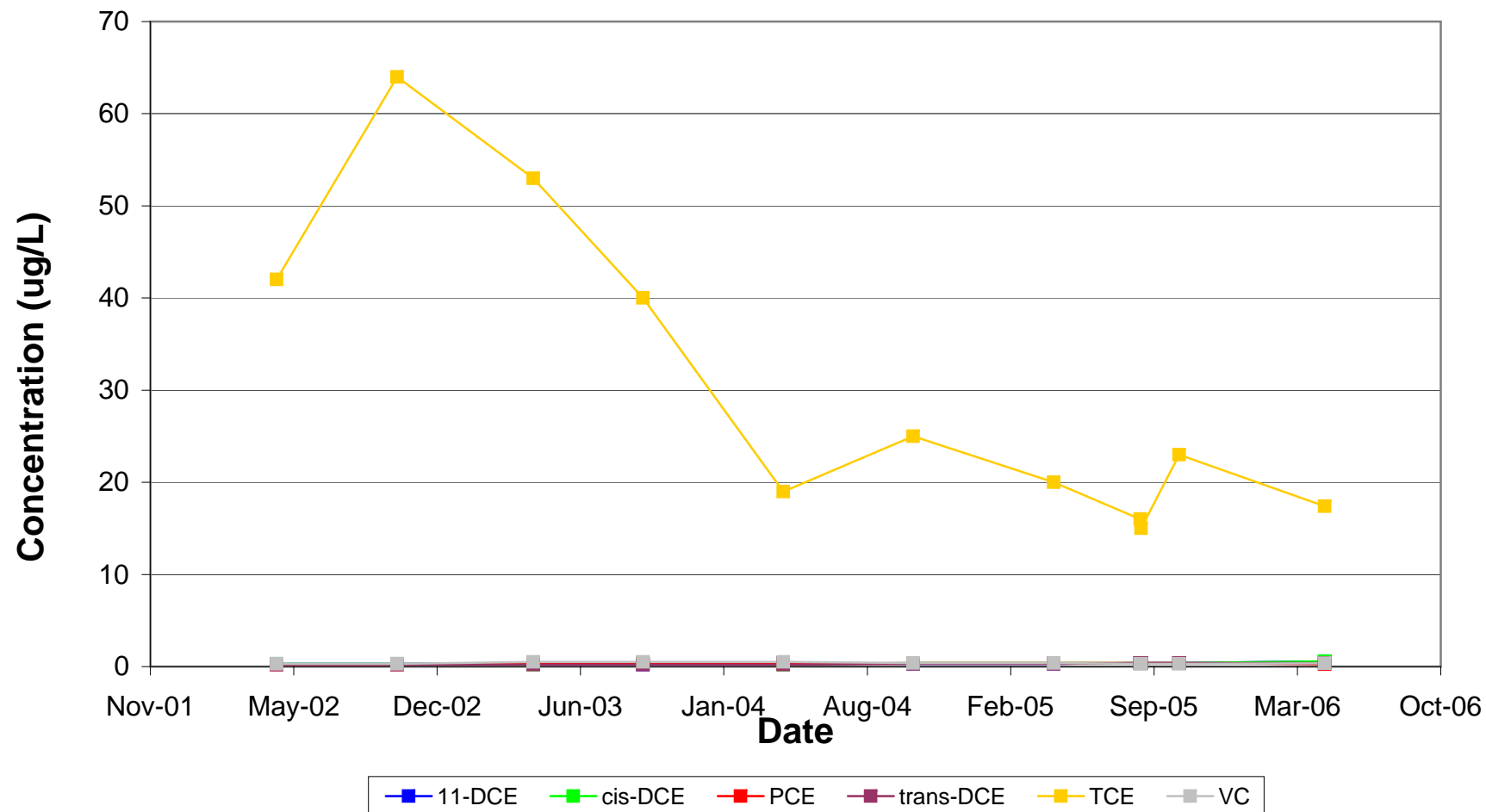
Note: The maximum concentration over the various depths was graphed.

MW35
111TCA, DCA, CA - 2002-2006
Concentration vs. Time



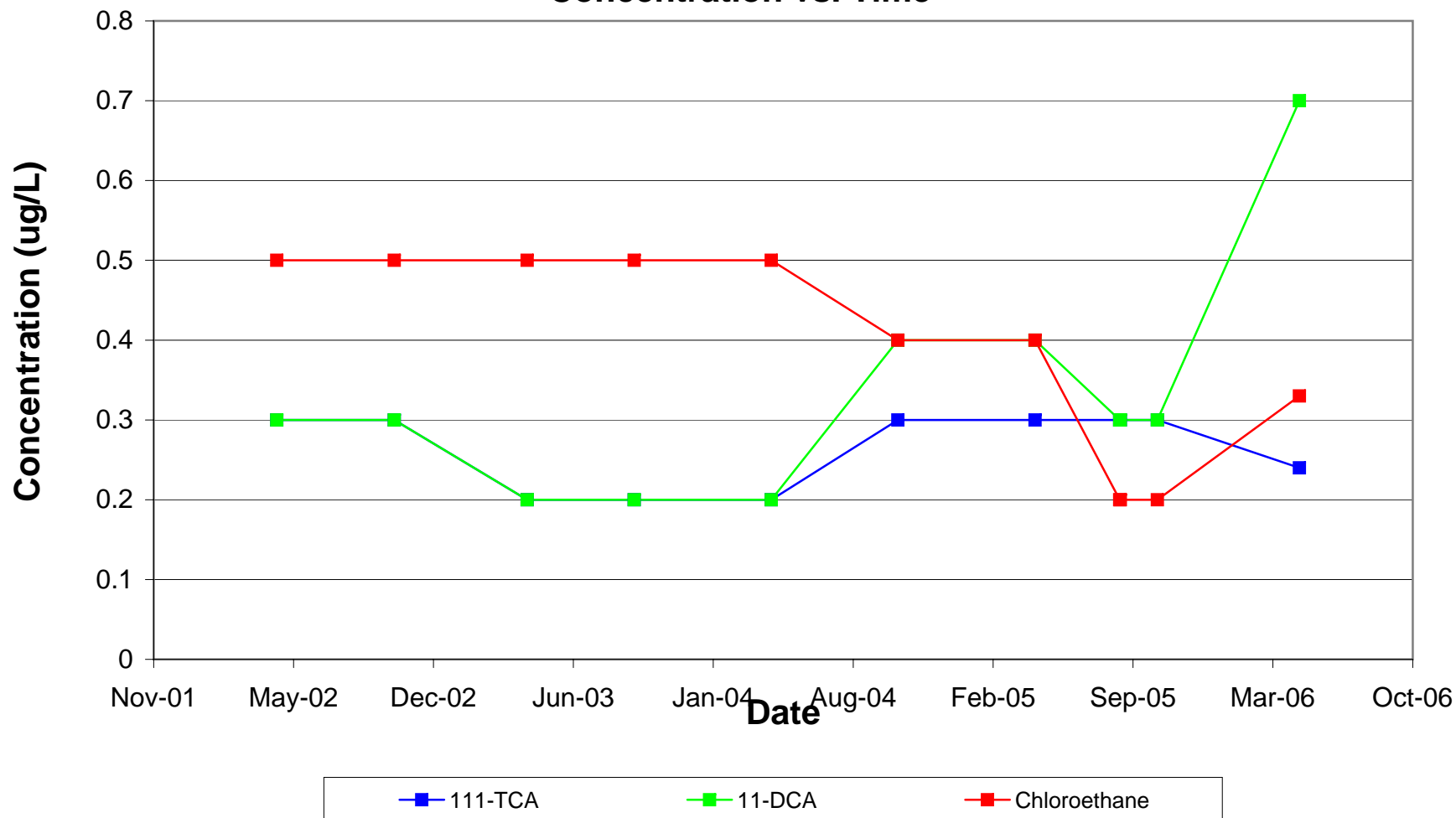
Note: The maximum concentration over the various depths was graphed.

MW37
PCE, TCE, DCE, VC - 2002-2006
Concentration vs. Time



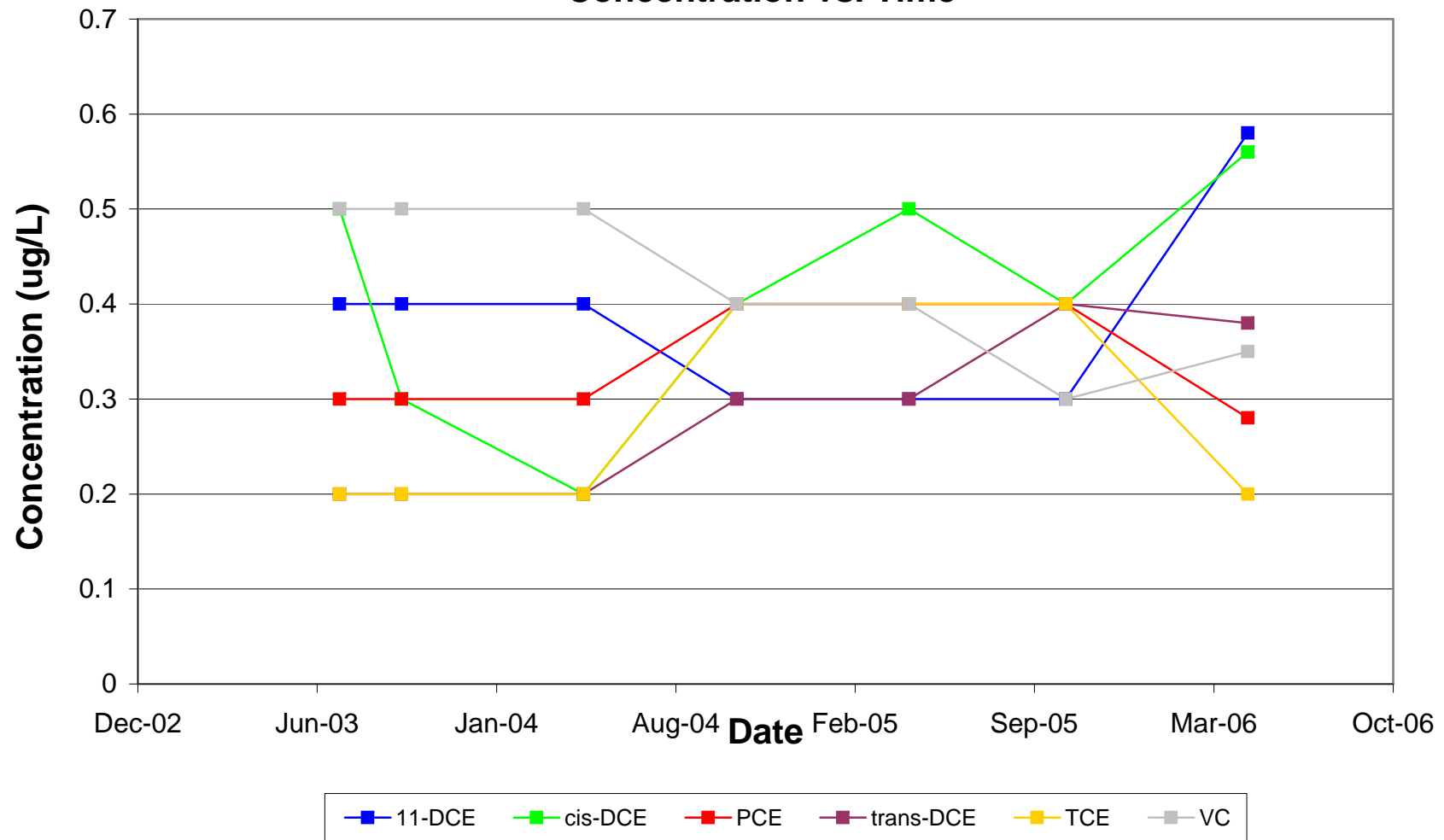
Note: The maximum concentration over the various depths was graphed.

MW37
111TCA, 11DCA, CA - 2002-2006
Concentration vs. Time



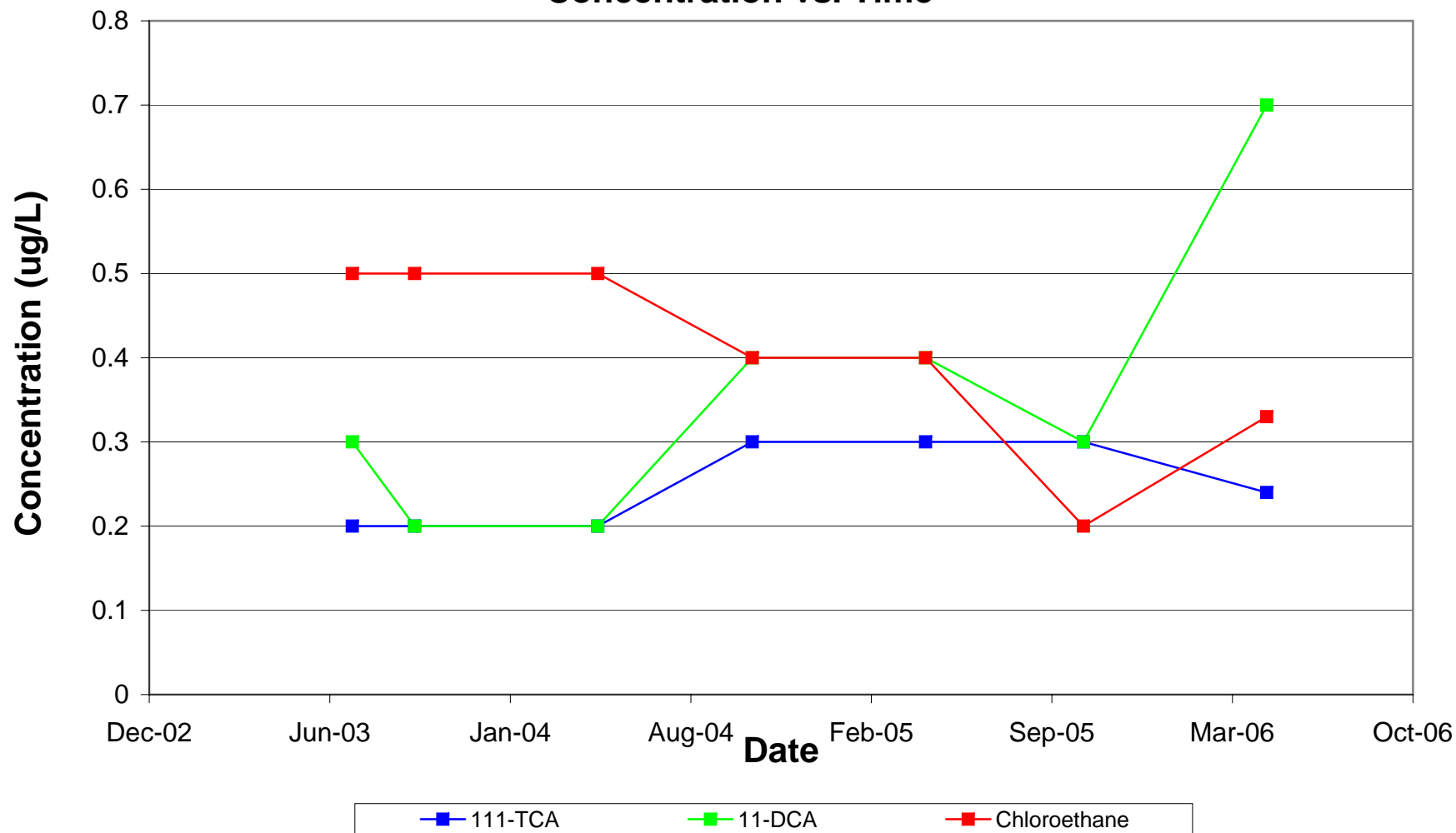
Note: The maximum concentration over the various depths was graphed.

MW53
PCE, TCE, DCE, VC - 2002-2006
Concentration vs. Time



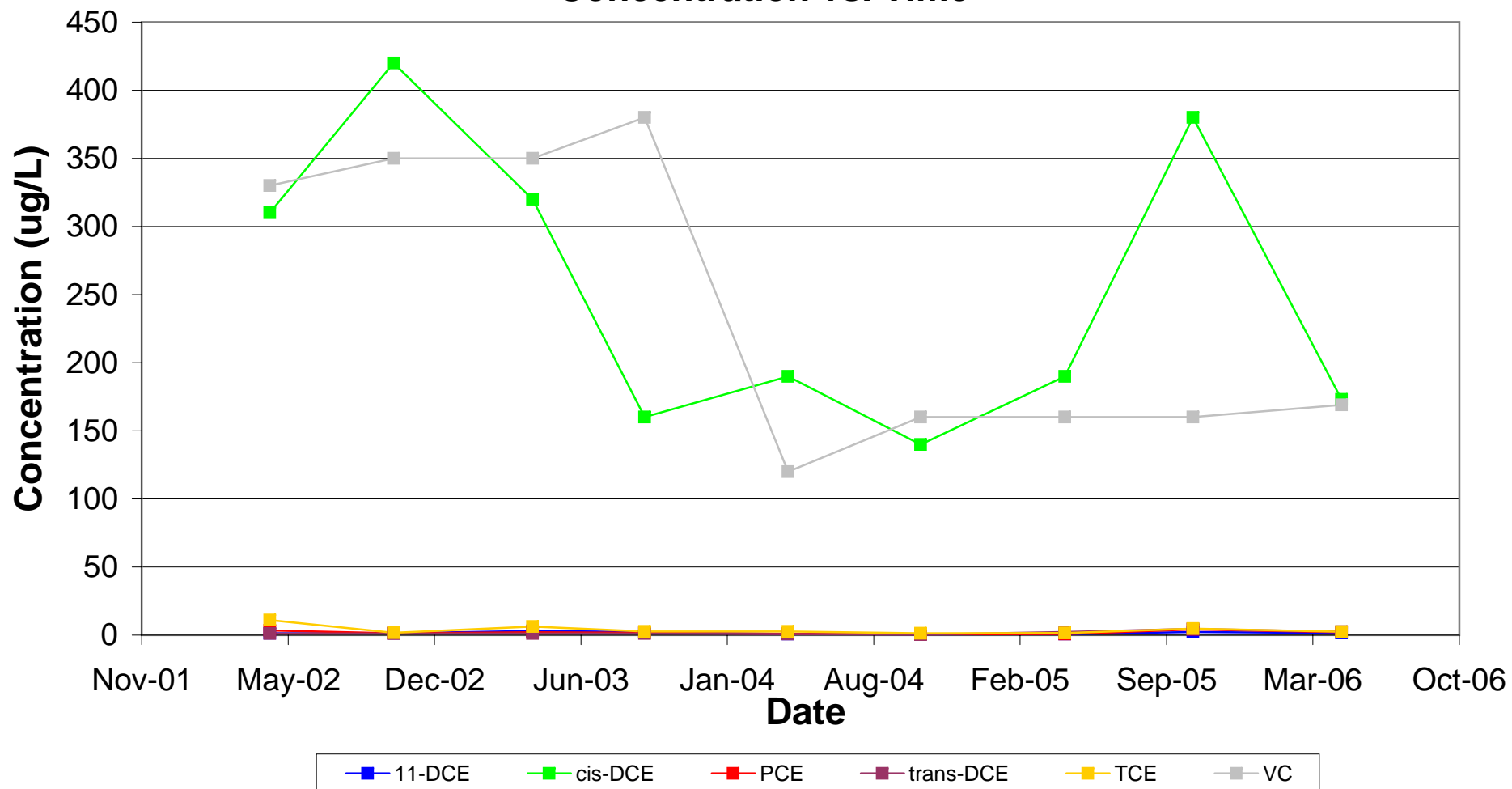
Note: The maximum concentration over the various depths was graphed.

MW53
111TCA, 11DCA, CA - 2002-2006
Concentration vs. Time



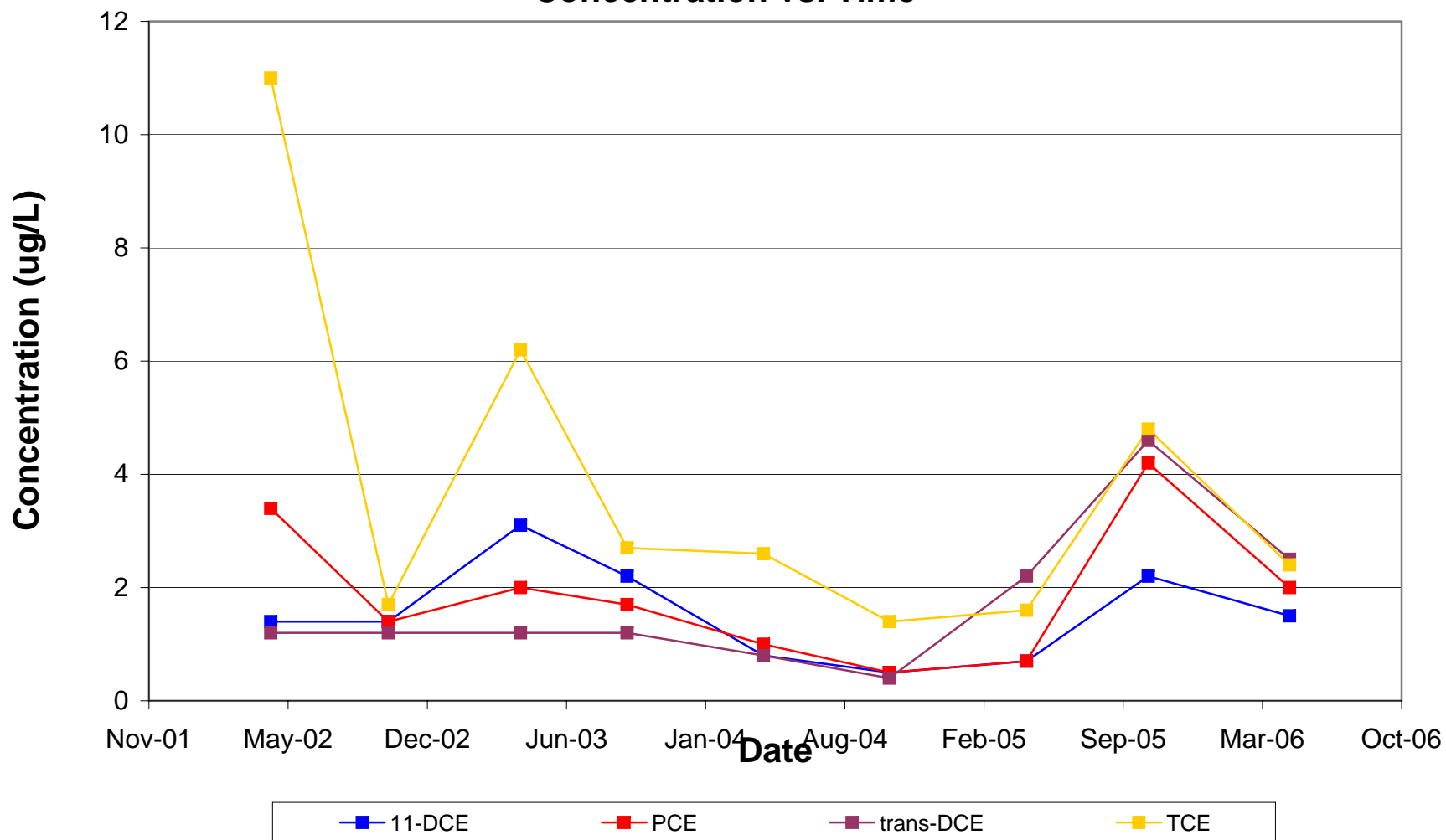
Note: The maximum concentration over the various depths was graphed.

RW9
PCE, TCE, DCE, VC - 2002-2006
Concentration vs. Time



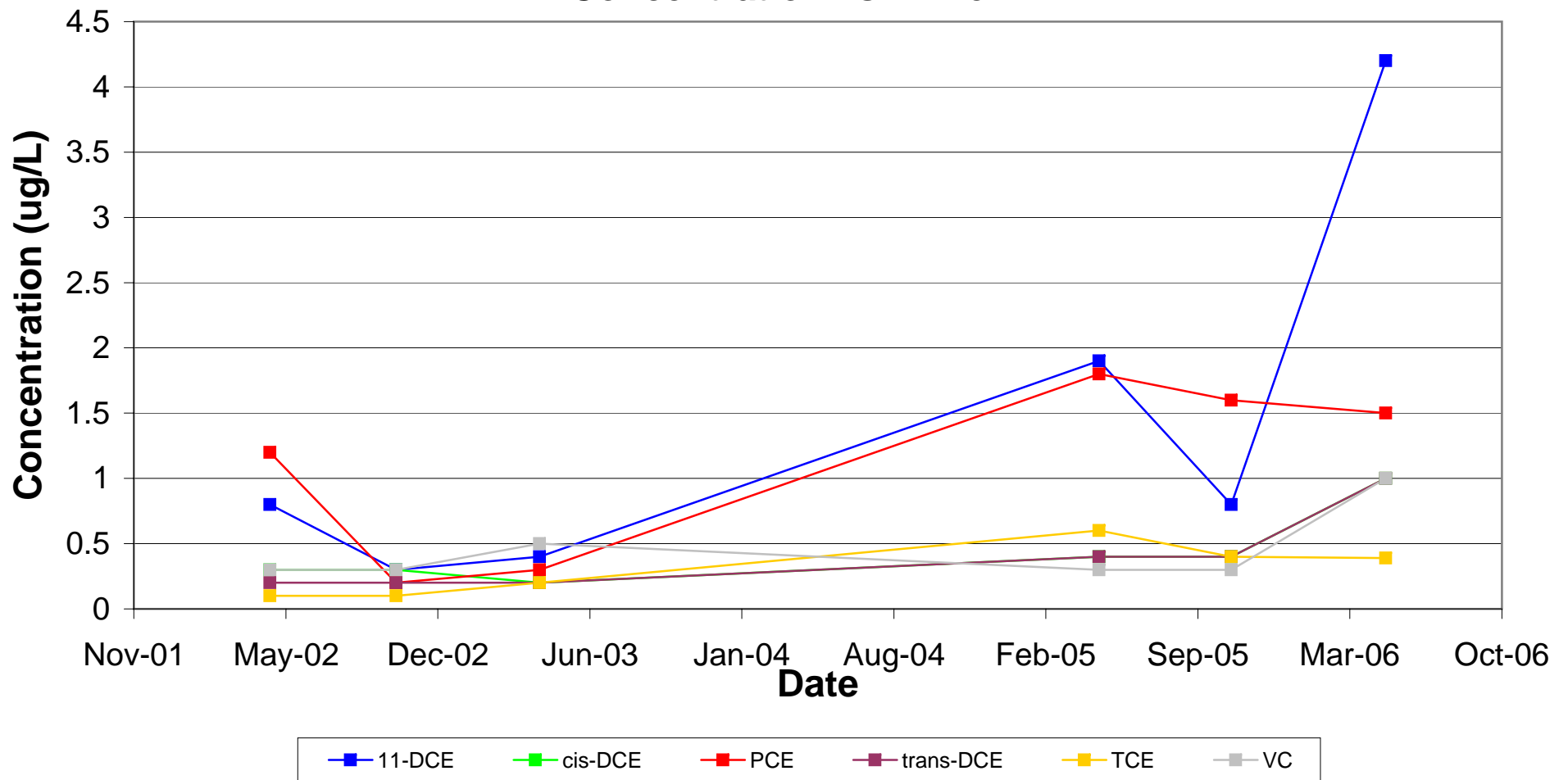
Note: The maximum concentration over the various depths was graphed.

RW9
111TCA, 11DCA, CA - 2002-2006
Concentration vs. Time



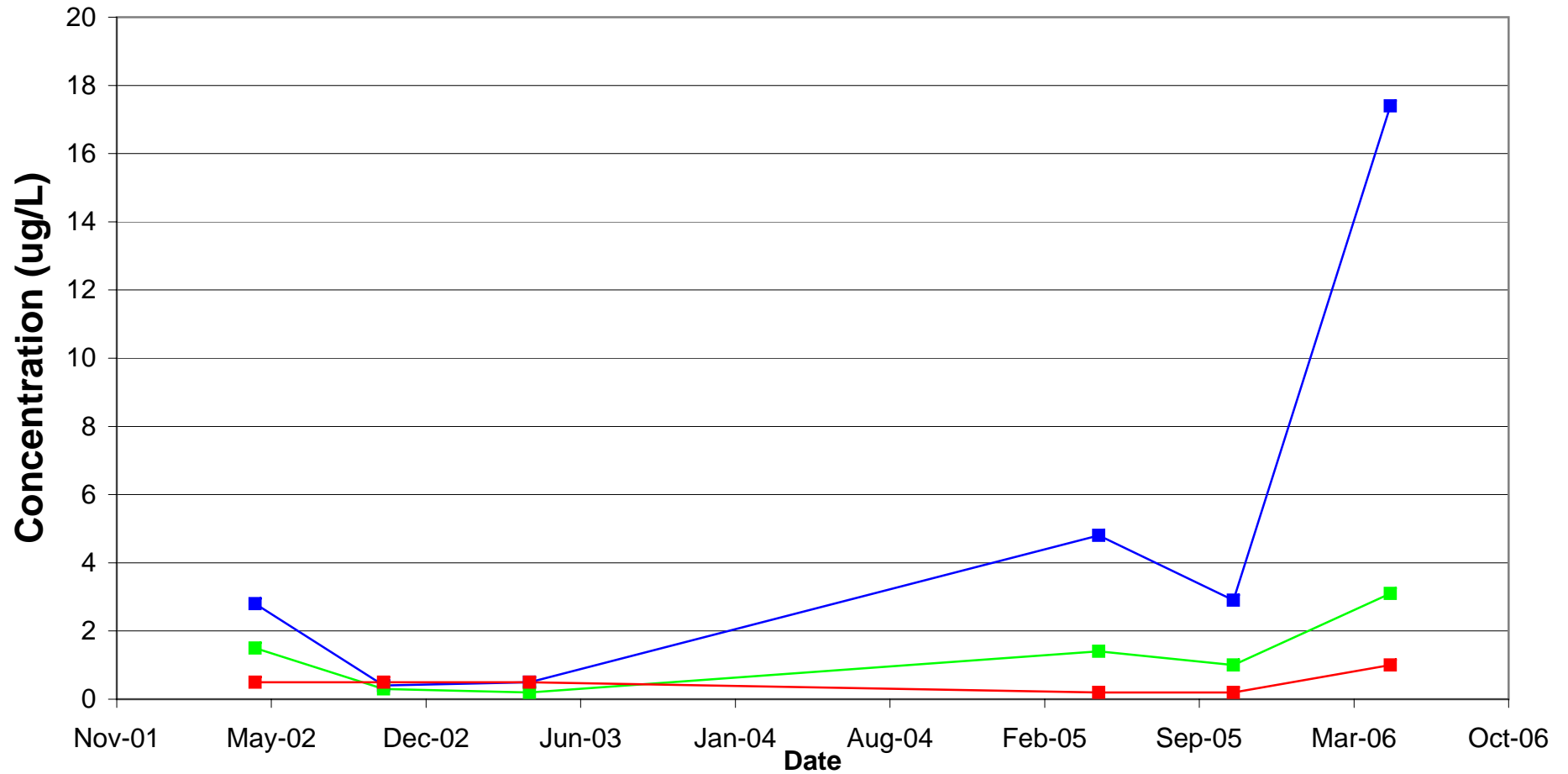
Note: The maximum concentration over the various depths was graphed.

RW13
PCE, TCE, DCE, VC - 2002-2006
Concentration vs. Time



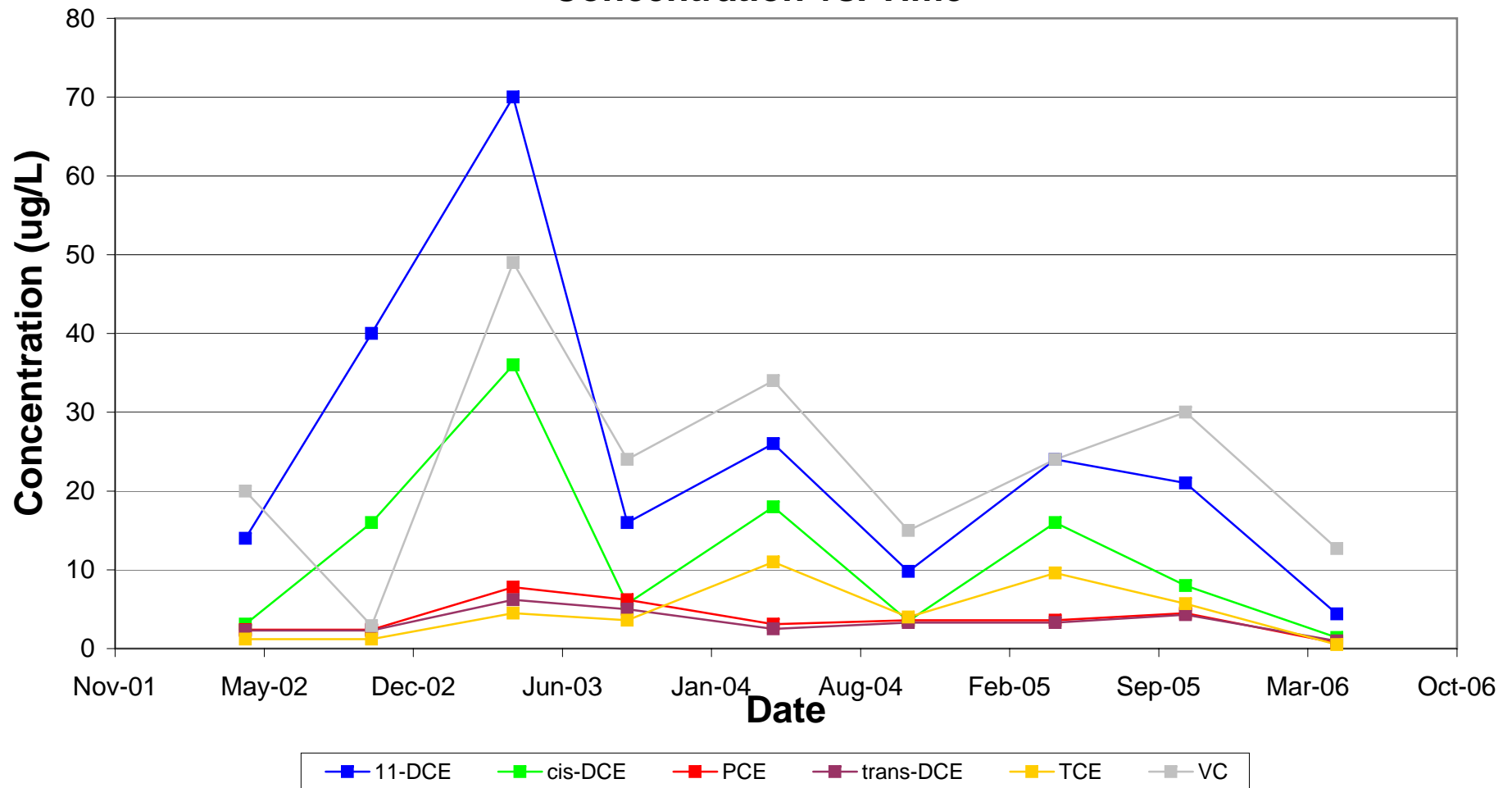
Note: The maximum concentration over the various depths was graphed.

RW13
111TCA, DCA, CA - 2002-2006
Concentration vs. Time



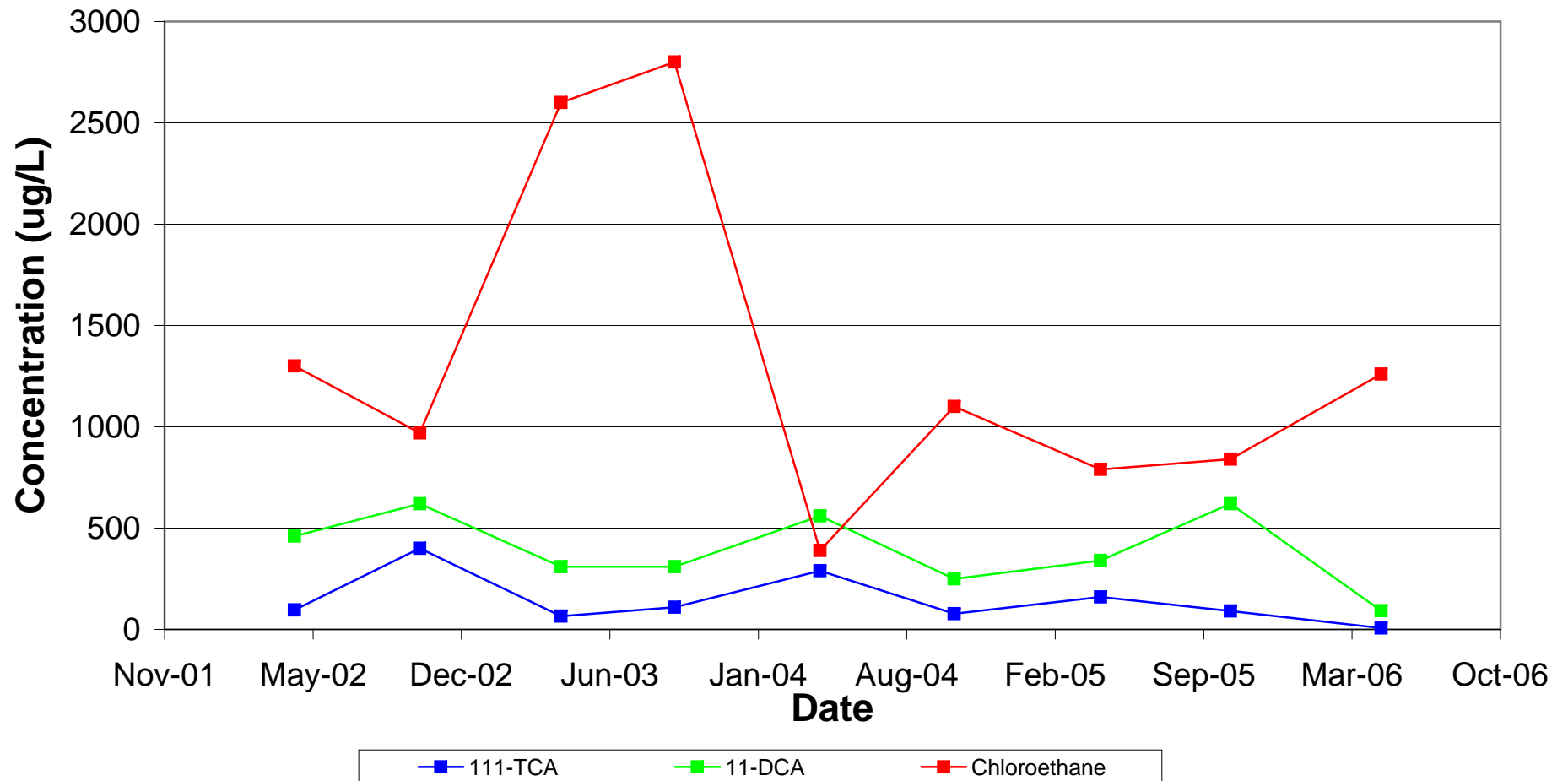
Note: The maximum concentration over the various depths was graphed.

RW16
PCE, TCE, DCE, VC -2002-2006
Concentration vs. Time



Note: The maximum concentration over the various depths was graphed.

RW16
111TCA, DCA, CA - 2002-2006
Concentration vs. Time



Note: The maximum concentration over the various depths was graphed.

TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			MW04A								
Lab ID	347429	383772	423938	463778	517912	569962	625354	676700	J29228-3		
Depth	107	96	96	96	96	96	96	96	96		
Sample Date	04/29/02	10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/18/05	10/10/05	05/01/06		
Sample Time	11:00	8:40	9:00	9:50	9:30	8:45	10:45	9:38	8:45		
VOCs via EPA Method 624 ¹	CAS_RN	GWQS									
1,1,1-Trichloroethane	71-55-6	30	1.2	1	1.4	0.8	1.7	0.5	0.8	0.6	(0.64) J
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.5) U	(0.3) U	(0.61) U
1,1-Dichloroethane	75-34-3	50	3.3	3	(0.2) U	1.9	1	1.2	0.5	1.5	1.1
1,1-Dichloroethylene	75-35-4	2	0.8	0.9	(0.4) U	0.9	(0.4) U	0.6	(0.3) U	(0.4) U	(0.72) J
1,2-Dichloroethane	107-06-2	2	(0.40) U	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.40) U	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U
Chloroethane	75-00-3	100	(0.50) U	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U
cis-1,2-Dichloroethene	156-59-2	70	89	100	0.6	70	0.9	69	1.1	72	42.7
Methylene Chloride	75-09-2	3	(0.90) U	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U	(0.9) U	(0.5) U	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	0.7	0.6	(0.2) U	0.9	(0.2) U	0.4	(0.3) U	1.3	(0.86) J
Tetrachloroethene	127-18-4	1	8.1	7.6	(0.3) U	15	(0.3) U	7.7	(0.4) U	7.4	6.7
Trichloroethylene	79-01-6	1	32	31	(0.2) U	21	0.5	19	0.4	20	13.9
Vinyl Chloride	75-01-4	5	26	43	(0.5) U	28	(0.5) U	33	(0.4) U	34	18.9
Total VOCs	--	--	161.1	187.1	2	138.5	4.1	131.4	2.8	136.8	84.3

NOTES:

All results are reported in micrograms per liter (ug/L).

PDB = Passive Diffusion Bag.

VOCs = Volatile Organic Compounds.

Depths are reported in feet (ft) below top of well casing.

Sample IDs ending in "P" indicate that it is a duplicate sample.

CAS_RN = Chemical Abstracts Service Registry Number.

¹ The analytes presented include only these for which at least on

U - Indicates that the analyte was not detected at the Method Detection Limit (MDL) shown in parenthesis.

ND = Not Detected.

Bold indicates that the concentration exceeds the NJDEP GWQS.

TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			MW04B								
Lab ID	347430	383773	423939	463779	517913	569963	625355	676701	J29228-4		
Depth	120	108	108	108	108	108	108	108	108		
Sample Date	04/29/02	10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/18/05	10/10/05	05/01/06		
Sample Time	11:05	8:45	9:05	9:55	9:35	8:50	10:50	9:40	8:48		
VOCs via EPA Method 624 ¹	CAS_RN	GWQS									
1,1,1-Trichloroethane	71-55-6	30	1.2	1	1.5	0.8	1.8	(0.3) U	0.9	0.7	(0.65) J
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.5) U	(0.3) U	(0.61) U
1,1-Dichloroethane	75-34-3	50	3.1	3.2	1.2	2	1.1	1.3	0.6	1.8	1.4
1,1-Dichloroethylene	75-35-4	2	0.9	0.8	(0.4) U	0.9	(0.4) U	0.6	(0.3) U	(0.4) U	(0.78) J
1,2-Dichloroethane	107-06-2	2	(0.40) U	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.40) U	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U
Chloroethane	75-00-3	100	(0.50) U	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U
cis-1,2-Dichloroethene	156-59-2	70	87	110	1.3	82	1.1	76	1.4	75	52.9
Methylene Chloride	75-09-2	3	(0.90) U	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U	(0.9) U	(0.5) U	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	0.5	0.5	(0.2) U	1.2	(0.2) U	0.5	(0.3) U	1.5	(0.83) J
Tetrachloroethene	127-18-4	1	7.9	7.9	0.5	18	(0.3) U	8.1	(0.4) U	7.1	10.6
Trichloroethylene	79-01-6	1	31	32	0.5	24	0.6	20	0.6	21	17.3
Vinyl Chloride	75-01-4	5	26	47	(0.5) U	34	(0.5) U	37	(0.4) U	34	25.2
Total VOCs	--	--	157.6	202.4	5	162.9	4.6	143.5	3.5	141.4	107.4

NOTES:

All results are reported in micrograms per liter (ug/L).

PDB = Passive Diffusion Bag.

VOCs = Volatile Organic Compounds.

Depths are reported in feet (ft) below top of well casing.

Sample IDs ending in "P" indicate that it is a duplicate sample.

CAS_RN = Chemical Abstracts Service Registry Number.

¹ The analytes presented include only these for which at least on

U - Indicates that the analyte was not detected at the Method Detection Limit (MDL) shown in parenthesis.

ND = Not Detected.

Bold indicates that the concentration exceeds the NJDEP GWQS.

TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			MW04C							
Lab ID	383774	423940	463780	517914	569964	625356	676702	J29228-5		
Depth	120	120	120	120	120	120	120	120		
Sample Date	10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/18/05	10/10/05	05/01/06		
Sample Time	8:50	9:10	10:00	9:40	8:55	10:55	9:45	8:52		
VOCs via EPA Method 624 ¹	CAS_RN	GWQS								
1,1,1-Trichloroethane	71-55-6	30	1	1.6	0.8	1.2	0.5	0.9	0.8	(0.63) J
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.5) U	(0.3) U	(0.61) U
1,1-Dichloroethane	75-34-3	50	3.4	1.7	2.1	1.8	1.2	1.1	1.7	1.4
1,1-Dichloroethylene	75-35-4	2	0.8	(0.4) U	0.9	(0.4) U	0.6	0.4	(0.4) U	(0.69) J
1,2-Dichloroethane	107-06-2	2	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U
Chloroethane	75-00-3	100	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U
cis-1,2-Dichloroethene	156-59-2	70	120	12	84	19	78	57	81	51.8
Methylene Chloride	75-09-2	3	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U	(0.9) U	0.5	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	0.6	(0.2) U	1.1	(0.2) U	0.5	5	7.8	9.4
Tetrachloroethene	127-18-4	1	7.5	4	16	4.2	7.8	0.7	1	(0.8) J
Trichloroethylene	79-01-6	1	33	4.9	23	6.1	21	7.2	22	16.8
Vinyl Chloride	75-01-4	5	49	(0.5) U	34	3.6	39	9.9	37	24.9
Total VOCs	--	--	215.3	24.2	161.9	35.9	148.6	82.2	151.8	104.3

NOTES:

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CAS_RN = Chemical Abstracts Service Registry Number.

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Limit (MDL) shown in parenthesis.

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TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			MW06A						
Lab ID	347434	383784	517926	569975	625370	676714	J29228-10		
Depth	110	110	110	110	110	110	172		
Sample Date	04/29/02	10/15/02	04/06/04	10/04/04	04/18/05	10/10/05	05/01/06		
Sample Time	11:45	9:35	11:35	11:10	13:05	11:10	9:40		
VOCs via EPA Method 624 ¹	CAS_RN	GWQS							
1,1,1-Trichloroethane	71-55-6	30	57	55	41	43	46	54	1.1
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.5) U	(0.3) U	(0.61) U
1,1-Dichloroethane	75-34-3	50	19	21	13	11	12	14	2.2
1,1-Dichloroethylene	75-35-4	2	10	4.2	4.3	4.3	4	2.9	(1) U
1,2-Dichloroethane	107-06-2	2	(0.40) U	(0.4) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.40) U	(0.4) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.3) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U
Chloroethane	75-00-3	100	(0.50) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U
cis-1,2-Dichloroethene	156-59-2	70	(0.3) U	(0.3) U	(0.2) U	(0.4) U	(0.4) U	(0.4) U	(1) U
Methylene Chloride	75-09-2	3	(0.90) U	(0.9) U	(0.8) U	(0.9) U	(0.9) U	(0.5) U	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.20) U	(0.2) U	(0.2) U	(0.3) U	1	(0.4) U	(1) U
Tetrachloroethene	127-18-4	1	0.5	1	1	0.8	(0.3) U	0.5	(1) U
Trichloroethylene	79-01-6	1	4.9	4.4	6	5.6	6.2	3.4	(0.24) J
Vinyl Chloride	75-01-4	5	(0.3) U	(0.3) U	(0.5) U	(0.4) U	(0.4) U	(0.3) U	(2) U
Total VOCs	--	--	91.4	85.6	65.3	64.7	69.2	74.8	3.3

NOTES:

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Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			MW06B						
Lab ID	347435	383785	517927	569976	625371	676715	J29228-11		
Depth	140	145	145	145	145	145	187		
Sample Date	04/29/02	10/15/02	04/06/04	10/04/04	04/18/05	10/10/05	05/01/06		
Sample Time	11:50	9:40	11:40	11:15	13:10	11:15	9:50		
VOCs via EPA Method 624 ¹	CAS_RN	GWQS							
1,1,1-Trichloroethane	71-55-6	30	55	60	42	43	45	55	6.3
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.5) U	(0.3) U	(0.61) U
1,1-Dichloroethane	75-34-3	50	18	23	14	12	12	14	1.1
1,1-Dichloroethylene	75-35-4	2	9.3	4.8	4.3	4.4	3.7	3.3	1.5
1,2-Dichloroethane	107-06-2	2	(0.40) U	(0.4) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.40) U	(0.4) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.3) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U
Chloroethane	75-00-3	100	(0.50) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U
cis-1,2-Dichloroethene	156-59-2	70	(0.3) U	(0.3) U	(0.2) U	(0.4) U	(0.4) U	(0.4) U	(1) U
Methylene Chloride	75-09-2	3	(0.90) U	(0.9) U	(0.8) U	(0.9) U	(0.9) U	(0.5) U	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.20) U	(0.2) U	(0.2) U	(0.3) U	0.7	(0.4) U	(1) U
Tetrachloroethene	127-18-4	1	0.5	0.6	0.7	0.7	(0.3) U	0.5	(1) U
Trichloroethylene	79-01-6	1	4.6	4.8	5.9	5.6	6	3.8	1.3
Vinyl Chloride	75-01-4	5	(0.3) U	(0.3) U	(0.5) U	(0.4) U	(0.4) U	(0.3) U	(2) U
Total VOCs	--	--	87.4	93.2	66.9	65.7	67.4	76.1	10.2

NOTES:

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TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			MW06C						MW15A		MW15B	
Lab ID	347436	383786	517928	569977	625372	676716	383791	J29360-11	383792	J29360-12		
Depth	185	187	187	187	187	187	120	130	135	136		
Sample Date	04/29/02	10/15/02	04/06/04	10/04/04	04/18/05	10/10/05	10/15/02	05/02/06	10/15/02	05/02/06		
Sample Time	11:55	9:45	11:45	11:20	13:15	11:20	11:30	8:45	11:35	8:50		
VOCs via EPA Method 624 ¹	CAS_RN	GWQS										
1,1,1-Trichloroethane	71-55-6	30	25	43	26	16	39	56	3.2	1.3	2.9	(0.84) J
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.5) U	(0.3) U	(0.3) U	(0.61) U	(0.3) U	(0.61) U
1,1-Dichloroethane	75-34-3	50	6.3	16	7.8	4.1	11	15	5	4.7	5.3	5.1
1,1-Dichloroethylene	75-35-4	2	5.3	4.5	3	1.7	3.4	3	1	(0.76) J	1.1	(1) U
1,2-Dichloroethane	107-06-2	2	(0.40) U	(0.4) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(0.4) U	(1) U	(0.4) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.40) U	(0.4) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(0.4) U	(1) U	(0.4) U	(1) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.3) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(1) U	(0.3) U	(1) U
Chloroethane	75-00-3	100	(0.50) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(0.5) U	(1) U	(0.5) U	(1) U
cis-1,2-Dichloroethene	156-59-2	70	(0.3) U	(0.3) U	(0.2) U	(0.4) U	(0.4) U	(0.4) U	5.8	(0.73) J	5.7	(0.66) J
Methylene Chloride	75-09-2	3	(0.90) U	(0.9) U	(0.8) U	(0.9) U	(0.9) U	(0.5) U	(0.9) U	(1) U	(0.9) U	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.20) U	(0.2) U	(0.2) U	(0.3) U	0.7	0.5	(0.2) U	(1) U	(0.2) U	(1) U
Tetrachloroethene	127-18-4	1	0.3	0.6	0.6	(0.4) U	(0.3) U	(0.4) U	0.3	(1) U	(0.2) U	(1) U
Trichloroethylene	79-01-6	1	2.6	3.8	4	2.1	5.2	3.7	1.2	(1) U	1.2	(1) U
Vinyl Chloride	75-01-4	5	(0.3) U	(0.3) U	(0.5) U	(0.4) U	(0.4) U	(0.3) U	(0.3) U	(2) U	(0.3) U	(2) U
Total VOCs	--	--	39.5	67.9	41.4	23.9	59.3	78.2	16.5	7	16.2	7.1

NOTES:

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Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			MW16A								MW16P
Lab ID	383808	423953	463792	517923	569956	625763	676741	J29360-7	463795		
Depth	130	130	130	130	130	130	130	130	130		
Sample Date	10/16/02	04/23/03	09/23/03	04/06/04	10/04/04	04/19/05	10/11/05	05/02/06	09/23/03		
Sample Time	8:25	11:05	12:00	11:05	10:30	10:54	11:05	8:20	12:15		
VOCs via EPA Method 624 ¹	CAS_RN	GWQS									
1,1,1-Trichloroethane	71-55-6	30	7.8	6.9	7.6	6.9	5.3	11	9.1	12.6	7.3
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.61) U	(0.3) U
1,1-Dichloroethane	75-34-3	50	6.1	6.6	6.1	6.5	4.5	3.5	6.6	5.2	5.9
1,1-Dichloroethylene	75-35-4	2	3.6	4	4.2	4	3.8	3.7	4.6	4.9	4.2
1,2-Dichloroethane	107-06-2	2	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U	(0.3) U
1,2-Dichloropropane	78-87-5	1	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U	(0.2) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U	(0.2) U
Chloroethane	75-00-3	100	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U	(0.5) U
cis-1,2-Dichloroethene	156-59-2	70	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	0.6	(0.4) U	(1) U	(0.2) U
Methylene Chloride	75-09-2	3	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U	(0.9) U	(0.5) U	(1) U	(0.8) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.4) U	(1) U	(0.2) U
Tetrachloroethene	127-18-4	1	2.4	1	1.3	0.6	0.9	5.5	0.8	(1) U	1.4
Trichloroethylene	79-01-6	1	0.7	(0.2) U	0.6	0.3	0.4	1.5	(0.4) U	(1) U	0.6
Vinyl Chloride	75-01-4	5	(0.3) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.3) U	(2) U	(0.5) U
Total VOCs	--	--	20.6	18.5	19.8	18.3	14.9	25.8	21.1	22.7	19.4

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Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			MW16B								MW16BP		
Lab ID	383809	423954	463793	517924	569957	625764	676742	J29360-8	625765	676743	J29360-9		
Depth	155	155	155	155	155	155	155	155	155	155	155		
Sample Date	10/16/02	04/23/03	09/23/03	04/06/04	10/04/04	04/19/05	10/11/05	05/02/06	04/19/05	10/11/05	05/02/06		
Sample Time	8:30	11:10	12:05	11:10	10:35	10:59	11:10	8:25	11:02	11:15	8:30		
VOCs via EPA Method 624 ¹	CAS_RN	GWQS											
1,1,1-Trichloroethane	71-55-6	30	5.8	2.8	7.6	6.5	5.6	10	5.8	8.3	10	5.8	8.6
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.61) U	(0.3) U	(0.3) U	(0.61) U
1,1-Dichloroethane	75-34-3	50	2.5	3.1	5.4	6	4	4.2	3	3.6	4.2	2.4	3.7
1,1-Dichloroethylene	75-35-4	2	2.5	2.2	3.8	4	3.4	2.8	3.3	3.6	2.8	2.5	4
1,2-Dichloroethane	107-06-2	2	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U	(0.4) U	(0.3) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U	(0.4) U	(0.3) U	(1) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U	(0.3) U	(0.3) U	(1) U
Chloroethane	75-00-3	100	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U	(0.4) U	(0.2) U	(1) U
cis-1,2-Dichloroethene	156-59-2	70	(0.3) U	(0.2) U	0.3	(0.2) U	(0.4) U	1.5	(0.4) U	(1) U	1.5	(0.4) U	(1) U
Methylene Chloride	75-09-2	3	(0.9) U	2.7	(0.8) U	(0.8) U	(0.9) U	(0.9) U	(0.5) U	(1) U	(0.9) U	(0.5) U	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.4) U	(1) U	(0.3) U	0.5	(0.39) U
Tetrachloroethene	127-18-4	1	0.7	(0.3) U	1.9	0.5	1.5	6.7	0.7	(1) U	6.4	(0.4) U	(1) U
Trichloroethylene	79-01-6	1	0.4	(0.2) U	0.7	0.4	0.7	2.7	(0.4) U	(1) U	2.8	(0.4) U	(1) U
Vinyl Chloride	75-01-4	5	(0.3) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.3) U	(2) U	(0.4) U	(0.3) U	(2) U
Total VOCs	--	--	11.9	10.8	19.7	17.4	15.2	27.9	12.8	15.5	27.7	11.2	16.3

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Phillipsburg, New Jersey

Sample ID			MW16C							
Lab ID	383810	423955	463794	517925	569958	625766	676744	J29360-10		
Depth	190	190	190	190	190	190	190	190		
Sample Date	10/16/02	04/23/03	09/23/03	04/06/04	10/04/04	04/19/05	10/11/05	05/02/06		
Sample Time	8:35	11:15	12:10	11:15	10:40	11:07	11:20	8:35		
VOCs via EPA Method 624 ¹	CAS_RN	GWQS								
1,1,1-Trichloroethane	71-55-6	30	4	4.8	4.8	6.2	4.4	9.9	7.3	7.5
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(1) U
1,1-Dichloroethane	75-34-3	50	(0.3) U	1.4	3.7	3.1	3.3	4.4	1.9	4.3
1,1-Dichloroethylene	75-35-4	2	1.7	1.5	2.7	1.7	2.4	2.8	3.3	3.9
1,2-Dichloroethane	107-06-2	2	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U
Chloroethane	75-00-3	100	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U
cis-1,2-Dichloroethene	156-59-2	70	(0.3) U	(0.2) U	(0.2) U	0.9	0.4	1.5	(0.4) U	(1) U
Methylene Chloride	75-09-2	3	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U	(0.9) U	(0.5) U	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	5.7	(0.4) U	(1) U
Tetrachloroethene	127-18-4	1	0.5	0.5	0.7	3.1	1.2	(0.3) U	0.9	(0.66) J
Trichloroethylene	79-01-6	1	(0.1) U	(0.2) U	0.4	1.6	0.7	2.5	0.5	(0.34) J
Vinyl Chloride	75-01-4	5	(0.3) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.3) U	(2) U
Total VOCs	--	--	6.2	8.2	12.3	16.6	12.4	26.8	13.9	15.7

NOTES:

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TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			MW32A								
Lab ID	347447	383787	423958	463790	517931	569978	625392	676722	J29360-13		
Depth	118	118	118	118	118	118	118	118	118	118	
Sample Date	04/29/02	10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/18/05	10/10/05	05/02/06		
Sample Time	14:45	11:00	11:45	11:35	12:25	11:30	14:05	13:40	9:00		
VOCs via EPA Method 624 ¹	CAS_RN	GWQS									
1,1,1-Trichloroethane	71-55-6	30	7.4	7.6	3.1	4.5	4.1	4.7	3.9	7.7	4.3
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.61) U
1,1-Dichloroethane	75-34-3	50	13	12	5.4	7.3	6.2	8.8	7.2	14	7.3
1,1-Dichloroethylene	75-35-4	2	3	2.5	1.1	1.9	1.6	1.8	1.5	2.4	2.1
1,2-Dichloroethane	107-06-2	2	(0.40) U	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.40) U	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U
Chloroethane	75-00-3	100	(0.50) U	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U
cis-1,2-Dichloroethene	156-59-2	70	4	3.7	2	3.8	2.7	2.5	1.7	2.5	1.3
Methylene Chloride	75-09-2	3	(0.90) U	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U	(0.9) U	(0.5) U	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.20) U	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.4) U	0.6	(0.51) J
Tetrachloroethene	127-18-4	1	0.6	0.6	0.5	0.5	0.6	0.5	(0.3) U	(0.4) U	(1) U
Trichloroethylene	79-01-6	1	2.4	2.1	1	1.7	1.8	1.7	1.3	2.4	1.2
Vinyl Chloride	75-01-4	5	(0.3) U	(0.3) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.3) U	(2) U
Total VOCs	--	--	30.4	28.5	13.1	19.7	17	20	15.6	29.6	16.2

NOTES:

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VOCs = Volatile Organic Compounds.

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TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			MW32B									MW32P
Lab ID	347448	383788	423959	463791	517932	569979	625393	676723	J29360-14	423978		
Depth	127	129	129	129	129	129	129	129	129	129		
Sample Date	04/29/02	10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/18/05	10/10/05	05/02/06	04/23/03		
Sample Time	14:50	11:05	11:50	11:40	12:30	11:40	14:10	13:45	9:05	11:55		
VOCs via EPA Method 624 ¹	CAS_RN	GWQS										
1,1,1-Trichloroethane	71-55-6	30	8.5	8	3.5	4.7	4.1	4.9	3.6	7.6	4.7	3.2
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.61) U	(0.3) U
1,1-Dichloroethane	75-34-3	50	14	13	5.5	7.6	6.6	8.8	6.9	14	7.8	5.3
1,1-Dichloroethylene	75-35-4	2	3.1	2.9	1.2	2	1.6	2	1.2	2.2	1.6	1.1
1,2-Dichloroethane	107-06-2	2	(0.40) U	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U	(0.3) U
1,2-Dichloropropane	78-87-5	1	(0.40) U	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U	(0.2) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U	(0.2) U
Chloroethane	75-00-3	100	(0.50) U	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U	(0.5) U
cis-1,2-Dichloroethene	156-59-2	70	4.4	4.5	2.4	3.7	2.6	2.6	1.7	2.8	1.3	2
Methylene Chloride	75-09-2	3	(0.90) U	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U	(0.9) U	(0.5) U	(1) U	(0.8) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.20) U	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.4) U	0.8	(0.61) J	(0.2) U
Tetrachloroethene	127-18-4	1	0.6	0.7	0.3	0.7	0.6	0.5	(0.3) U	(0.4) U	(1) U	0.5
Trichloroethylene	79-01-6	1	2.5	2	1.2	1.7	1.8	1.8	1.2	2.2	1.4	0.9
Vinyl Chloride	75-01-4	5	(0.3) U	(0.3) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.3) U	(2) U	(0.5) U
Total VOCs	--	--	33.1	31.1	14.1	20.4	17.3	20.6	14.6	29.6	16.8	13

NOTES:

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TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			MW33AA								
Lab ID	347441	383780	423949	463786	517920	569952	625368	676712	J29228-19		
Depth	120	107	107	107	107	107	107	107	107		
Sample Date	04/29/02	10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/18/05	10/10/05	05/01/06		
Sample Time	13:40	9:50	10:30	11:05	10:35	10:10	12:35	10:55	11:20		
VOCs via EPA Method 624 ¹	CAS_RN	GWQS									
1,1,1-Trichloroethane	71-55-6	30	3.5	7.5	4.9	5.4	1.4	3.5	3.2	2	1.6
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.61) U
1,1-Dichloroethane	75-34-3	50	1.1	2	(0.2) U	1.2	(0.2) U	0.6	0.6	0.9	(1) U
1,1-Dichloroethylene	75-35-4	2	1.9	5.1	2.9	3.1	1	2.1	1.5	1.1	1.1
1,2-Dichloroethane	107-06-2	2	(0.40) U	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.40) U	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U
Chloroethane	75-00-3	100	(0.50) U	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U
cis-1,2-Dichloroethene	156-59-2	70	(0.3) U	(0.3) U	(0.2) U	0.5	(0.2) U	(0.4) U	(0.4) U	(0.4) U	(1) U
Methylene Chloride	75-09-2	3	(0.90) U	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U	(0.9) U	(0.5) U	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.20) U	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	2.2	1	(1) U
Tetrachloroethene	127-18-4	1	1.3	4.1	3.7	2.9	0.5	1.7	(0.3) U	(0.4) U	1
Trichloroethylene	79-01-6	1	3.2	9.4	8	6.5	2.2	4.7	4.2	1.9	2.5
Vinyl Chloride	75-01-4	5	(0.3) U	(0.3) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.3) U	(2) U
Total VOCs	--	--	11	28.1	19.5	19.6	5.1	12.6	11.7	6.9	6.2

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TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			MW33AB							MW33AP			
Lab ID	383781	423950	463787	517921	569953	625369	676713	J29228-20	347442	517922	569954		
Depth	120	120	120	120	120	120	120	120	120	120	107		
Sample Date	10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/18/05	10/10/05	05/01/06	04/29/02	04/06/04	10/04/04		
Sample Time	9:55	10:35	11:10	10:40	10:10	12:40	10:59	11:25	13:45	10:45	10:20		
VOCs via EPA Method 624 ¹	CAS_RN	GWQS											
1,1,1-Trichloroethane	71-55-6	30	5.9	3	3.3	1.2	2	1.9	3	1.4	3.4	1.4	3.4
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.61) U	(0.3) U	(0.3) U	(0.3) U
1,1-Dichloroethane	75-34-3	50	1.7	(0.2) U	0.9	(0.2) U	0.5	0.5	1.4	(1) U	1.1	(0.2) U	0.5
1,1-Dichloroethylene	75-35-4	2	3.7	1.5	1.7	0.7	0.9	0.9	1.5	(0.96) J	1.5	1.1	1.9
1,2-Dichloroethane	107-06-2	2	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U	(0.40) U	(0.3) U	(0.4) U
1,2-Dichloropropane	78-87-5	1	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U	(0.40) U	(0.2) U	(0.4) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U	(0.3) U	(0.2) U	(0.3) U
Chloroethane	75-00-3	100	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U	(0.50) U	(0.5) U	(0.4) U
cis-1,2-Dichloroethene	156-59-2	70	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.4) U	(1) U	(0.3) U	(0.2) U	(0.4) U
Methylene Chloride	75-09-2	3	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U	(0.9) U	(0.5) U	(1) U	(0.90) U	(0.8) U	(0.9) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	1.9	1.3	(0.94) J	(0.20) U	(0.2) U	(0.3) U
Tetrachloroethene	127-18-4	1	3.8	2.1	2.6	0.9	1.7	(0.3) U	(0.4) U	(1) U	1.4	0.5	1.8
Trichloroethylene	79-01-6	1	7.3	4	3.6	1.4	2.8	2.5	3.5	2	3.1	2.3	4.6
Vinyl Chloride	75-01-4	5	(0.3) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.3) U	(2) U	(0.3) U	(0.5) U	(0.4) U
Total VOCs	--	--	22.4	10.6	12.1	4.2	7.9	7.7	10.7	3.4	10.5	5.3	12.2

NOTES:

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TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			MW34A								
Lab ID	347437	383777	423946	463783	517917	569972	625364	676708	J29228-15		
Depth	108	108	108	108	108	108	108	108	108		
Sample Date	04/29/02	10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/18/05	10/10/05	05/01/06		
Sample Time	12:05	9:30	10:10	10:45	10:15	9:45	12:05	10:37	10:35		
VOCs via EPA Method 624 ¹	CAS_RN	GWQS									
1,1,1-Trichloroethane	71-55-6	30	1.7	3.8	2.6	3.1	3	1.7	2.3	2.2	1.9
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(1) U
1,1-Dichloroethane	75-34-3	50	(0.3) U	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	0.4	(1) U
1,1-Dichloroethylene	75-35-4	2	(0.3) U	0.9	(0.4) U	0.9	0.8	(0.3) U	0.4	0.6	(0.63) J
1,2-Dichloroethane	107-06-2	2	(0.40) U	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.40) U	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U
Chloroethane	75-00-3	100	(0.50) U	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U
cis-1,2-Dichloroethene	156-59-2	70	1.2	2.3	0.5	0.4	0.9	(0.4) U	(0.4) U	(0.4) U	(1) U
Methylene Chloride	75-09-2	3	(0.90) U	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U	0.9	(0.5) U	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.20) U	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.4) U	(1) U
Tetrachloroethene	127-18-4	1	0.6	3.1	0.5	1	1.2	0.4	0.9	0.8	(0.9) J
Trichloroethylene	79-01-6	1	2.3	4.2	1.8	2.4	3.2	1.3	2.3	2.7	2.7
Vinyl Chloride	75-01-4	5	(0.3) U	(0.3) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.3) U	(2) U
Total VOCs	--	--	5.8	14.3	5.4	7.8	9.1	3.4	6.8	6.7	4.6

NOTES:

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TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			MW34B								
Lab ID	347438	383778	423947	463784	517918	569973	625365	676709	J29228-16		
Depth	113	113	113	113	113	118	113	113	113		
Sample Date	04/29/02	10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/18/05	10/10/05	05/01/06		
Sample Time	12:10	9:35	10:15	10:50	10:20	9:48	12:10	10:39	10:40		
VOCs via EPA Method 624 ¹	CAS_RN	GWQS									
1,1,1-Trichloroethane	71-55-6	30	4.6	4.4	4.6	3.1	3	1.7	2	1.8	1.7
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(1) U
1,1-Dichloroethane	75-34-3	50	0.9	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U
1,1-Dichloroethylene	75-35-4	2	1.9	1.1	0.6	0.9	0.7	(0.3) U	(0.3) U	(0.4) U	(0.65) J
1,2-Dichloroethane	107-06-2	2	(0.40) U	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.40) U	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U
Chloroethane	75-00-3	100	(0.50) U	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U
cis-1,2-Dichloroethene	156-59-2	70	7.6	2.4	5.3	0.8	1.9	(0.4) U	0.4	(0.4) U	(0.8) J
Methylene Chloride	75-09-2	3	(0.90) U	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U	(0.9) U	(0.5) U	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.20) U	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.4) U	(1) U
Tetrachloroethene	127-18-4	1	2.5	4.1	4.2	1.4	1.2	0.5	0.7	1	1.1
Trichloroethylene	79-01-6	1	7.7	4.4	7.6	2.8	3.2	1.4	1.9	2.7	2.8
Vinyl Chloride	75-01-4	5	(0.3) U	(0.3) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.3) U	(2) U
Total VOCs	--	--	25.2	16.4	22.3	9	10	3.6	5	5.5	5.6

NOTES:

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Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			MW34C							
Lab ID	383779	423948	463785	517919	569974	625366	676710	J29228-17		
Depth	120	120	120	120	120	120	120	120		
Sample Date	10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/18/05	10/10/05	05/01/06		
Sample Time	9:40	10:20	10:55	10:25	9:50	12:15	10:40	10:45		
VOCs via EPA Method 624 ¹	CAS_RN	GWQS								
1,1,1-Trichloroethane	71-55-6	30	5	3.2	4.1	3.1	1.7	2.4	2	1.6
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(1) U
1,1-Dichloroethane	75-34-3	50	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U
1,1-Dichloroethylene	75-35-4	2	1	(0.4) U	0.8	0.9	0.4	0.6	0.6	(0.64) J
1,2-Dichloroethane	107-06-2	2	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U
Chloroethane	75-00-3	100	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U
cis-1,2-Dichloroethene	156-59-2	70	5.1	2.2	2.9	2.2	0.8	0.9	1	(0.75) J
Methylene Chloride	75-09-2	3	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U	(0.9) U	(0.5) U	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.4) U	(1) U
Tetrachloroethene	127-18-4	1	5.7	1.6	3.2	1.6	1.2	1.8	1.9	1.7
Trichloroethylene	79-01-6	1	6.5	3.4	4.9	3.8	2.4	3.4	3	2.6
Vinyl Chloride	75-01-4	5	(0.3) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.3) U	(2) U
Total VOCs	--	--	23.3	10.4	15.9	11.6	6.5	9.1	8.5	5.9

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Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			MW35A								
Lab ID	347439	383775	423944	463781	517915	569968	625360	676706	J29228-12		
Depth	122	122	122	122	122	122	122	122	122		
Sample Date	04/29/02	10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/18/05	10/10/05	05/01/06		
Sample Time	12:25	9:10	9:55	10:25	9:55	9:40	11:30	10:15	10:00		
VOCs via EPA Method 624 ¹	CAS_RN	GWQS									
1,1,1-Trichloroethane	71-55-6	30	82	140	150	140	100	93	130	88	88.9
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.7) U	(0.7) U	(0.3) U	(0.3) U	(0.6) U	(0.3) U	(1) U
1,1-Dichloroethane	75-34-3	50	26	41	60	50	34	21	50	16	17.1
1,1-Dichloroethylene	75-35-4	2	16	10	7.4	8.2	6.2	6.6	5.7	5	4.2
1,2-Dichloroethane	107-06-2	2	(0.40) U	(0.4) U	(0.5) U	(0.5) U	(0.3) U	(0.4) U	(0.7) U	(0.3) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.40) U	(0.4) U	(0.5) U	(0.5) U	(0.2) U	(0.4) U	(0.7) U	(0.3) U	(1) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.2) U	(0.3) U	(0.6) U	(0.3) U	(1) U
Chloroethane	75-00-3	100	(0.50) U	(0.5) U	(0.9) U	(0.9) U	(0.5) U	(0.4) U	(0.7) U	(0.2) U	(1) U
cis-1,2-Dichloroethene	156-59-2	70	1.2	1.1	(0.5) U	1.2	1.2	0.4	(0.7) U	0.8	(1) U
Methylene Chloride	75-09-2	3	(0.90) U	(0.9) U	(1.6) U	(1.6) U	(0.8) U	(0.9) U	1.8	(0.5) U	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.20) U	(0.2) U	(0.5) U	(0.5) U	(0.2) U	(0.3) U	(0.7) U	(0.4) U	(1) U
Tetrachloroethene	127-18-4	1	1.4	4.8	3.4	4.3	2.2	2.2	3.3	2.3	2.5
Trichloroethylene	79-01-6	1	11	14	14	14	9	8.4	11	8.1	6.3
Vinyl Chloride	75-01-4	5	(0.3) U	(0.3) U	(1.1) U	(1.1) U	(0.5) U	(0.4) U	(0.7) U	(0.3) U	(2) U
Total VOCs	--	--	137.6	210.9	234.8	217.7	152.6	131.6	201.8	120.2	119

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Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			MW35B								MW35BP	
Lab ID	347440	383776	423945	463782	517916	569969	625361	676707	J29228-13	625362		
Depth	128	128	128	128	128	128	128	128	128	128		
Sample Date	04/29/02	10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/18/05	10/10/05	05/01/06	04/18/05		
Sample Time	12:30	9:15	10:00	10:30	10:00	9:35	11:35	10:19	10:05	11:40		
VOCs via EPA Method 624 ¹	CAS_RN	GWQS										
1,1,1-Trichloroethane	71-55-6	30	82	81	88	150	71	53	70	57	82.4	74
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(1) U	(0.3) U
1,1-Dichloroethane	75-34-3	50	25	22	26	49	21	10	16	10	15.5	16
1,1-Dichloroethylene	75-35-4	2	16	7.5	5.7	9.5	4.3	4.4	4.6	3.6	4.2	4.2
1,2-Dichloroethane	107-06-2	2	(0.40) U	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U	(0.4) U
1,2-Dichloropropane	78-87-5	1	(0.40) U	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U	(0.4) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U	(0.3) U
Chloroethane	75-00-3	100	(0.50) U	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U	(0.4) U
cis-1,2-Dichloroethene	156-59-2	70	1.3	1.2	0.7	1.2	1.3	(0.4) U	(0.4) U	0.7	(1) U	(0.4) U
Methylene Chloride	75-09-2	3	(0.90) U	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U	(0.9) U	(0.5) U	(1) U	(0.9) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.20) U	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.4) U	(1) U	(0.3) U
Tetrachloroethene	127-18-4	1	2.6	3.1	2.6	6.2	2.5	1.3	2	2.2	2.4	2
Trichloroethylene	79-01-6	1	12	9.9	9.2	12	7.1	5.9	6	6.5	5.8	6.4
Vinyl Chloride	75-01-4	5	(0.3) U	(0.3) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.3) U	(2) U	(0.4) U
Total VOCs	--	--	138.9	124.7	132.2	227.9	107.2	74.6	98.6	80	110.3	102.6

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Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			MW37A							
Lab ID	383769	423941	463775	517908	569965	6625357	676703	J29228-6		
Depth	60	60	60	60	60	60	60	60		
Sample Date	10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/18/05	10/10/05	05/01/06		
Sample Time	8:10	9:15	9:05	9:00	9:30	11:15	10:00	9:00		
VOCs via EPA Method 624 ¹	CAS_RN	GWQS								
1,1,1-Trichloroethane	71-55-6	30	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(1) U
1,1-Dichloroethane	75-34-3	50	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U
1,1-Dichloroethylene	75-35-4	2	(0.3) U	(0.4) U	(0.4) U	(0.4) U	(0.3) U	(0.3) U	(0.4) U	(1) U
1,2-Dichloroethane	107-06-2	2	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U
Carbon tetrachloride	56-23-5	2	1.2	1.3	2	1.8	0.8	0.8	1	1.5
Chloroethane	75-00-3	100	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U
cis-1,2-Dichloroethene	156-59-2	70	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.4) U	(1) U
Methylene Chloride	75-09-2	3	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U	(0.9) U	3.3	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.4) U	(1) U
Tetrachloroethene	127-18-4	1	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.4) U	(1) U
Trichloroethylene	79-01-6	1	17	13	19	17	11	9.5	8.2	11.6
Vinyl Chloride	75-01-4	5	(0.3) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.3) U	(2) U
Total VOCs	--	--	18.2	14.3	21	18.8	11.8	10.3	12.5	13.1

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Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			MW37B							
Lab ID	383770	423942	463776	517909	569966	625358	676704	J29228-7		
Depth	86	86	86	86	86	86	86	86		
Sample Date	10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/18/05	10/10/05	05/01/06		
Sample Time	8:15	9:20	9:10	9:05	9:32	11:20	10:04	9:05		
VOCs via EPA Method 624 ¹	CAS_RN	GWQS								
1,1,1-Trichloroethane	71-55-6	30	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(1) U
1,1-Dichloroethane	75-34-3	50	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U
1,1-Dichloroethylene	75-35-4	2	(0.3) U	(0.4) U	(0.4) U	(0.4) U	(0.3) U	(0.3) U	(0.4) U	(1) U
1,2-Dichloroethane	107-06-2	2	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U
Carbon tetrachloride	56-23-5	2	6.2	4.6	4.4	1.8	0.7	0.9	1.8	(0.58) J
Chloroethane	75-00-3	100	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U
cis-1,2-Dichloroethene	156-59-2	70	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.4) U	(1) U
Methylene Chloride	75-09-2	3	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U	(0.9) U	1.4	1.3
Trans-1,2-Dichloroethene	156-60-5	100	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.4) U	(1) U
Tetrachloroethene	127-18-4	1	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.4) U	(1) U
Trichloroethylene	79-01-6	1	62	48	40	18	11	9.8	15	4.7
Vinyl Chloride	75-01-4	5	(0.3) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.3) U	(2) U
Total VOCs	--	--	68.2	52.6	44.4	19.8	11.7	10.7	18.2	6

NOTES:

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TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			MW37C								MW37CP
Lab ID			383771	423943	463777	517910	569967	625359	676705	J29228-8	J29228-9
Depth			98	98	98	98	98	98	98	98	98
Sample Date			10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/18/05	10/10/05	05/01/06	05/01/06
Sample Time			8:20	9:25	9:15	9:10	9:35	11:25	10:09	9:10	9:15
VOCs via EPA Method 624 ¹	CAS_RN	GWQS									
1,1,1-Trichloroethane	71-55-6	30	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U	(1) U
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(1) U	(1) U
1,1-Dichloroethane	75-34-3	50	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U	(1) U
1,1-Dichloroethylene	75-35-4	2	(0.3) U	(0.4) U	(0.4) U	(0.4) U	(0.3) U	(0.3) U	(0.4) U	(1) U	(1) U
1,2-Dichloroethane	107-06-2	2	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U	(1) U
Carbon tetrachloride	56-23-5	2	6.5	5.1	3.7	1.8	2.5	1.9	3.4	2.7	2.3
Chloroethane	75-00-3	100	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U	(1) U
cis-1,2-Dichloroethene	156-59-2	70	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.4) U	(1) U	(1) U
Methylene Chloride	75-09-2	3	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U	(0.9) U	(0.5) U	(1) U	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.4) U	(1) U	(1) U
Tetrachloroethene	127-18-4	1	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.4) U	(1) U	(1) U
Trichloroethylene	79-01-6	1	64	53	34	19	25	20	23	17.4	15.1
Vinyl Chloride	75-01-4	5	(0.3) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.3) U	(2) U	(2) U
Total VOCs	--	--	70.5	58.1	37.7	20.8	27.5	21.9	26.4	20.1	17.4

NOTES:

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TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			RW09A							
Lab ID			347413	383798	423960	463805	517948	625359	676758	J29360-41
Depth			118	90	90	90	90	90	90	90
Sample Date			04/29/02	10/15/02	04/23/03	09/23/03	04/06/04	04/19/05	10/11/05	05/02/06
Sample Time			12:00	14:25	12:10	14:35	15:15	15:27	14:00	14:35
VOCs via EPA Method 624 ¹	CAS_RN	GWQS								
1,1,1-Trichloroethane	71-55-6	30	(0.50) U	(1.3) U	(0.3) U	(0.2) U	(0.2) U	(0.6) U	(0.7) U	(1) U
1,1,2-Trichloroethane	79-00-5	3	(0.60) U	(1.4) U	(0.7) U	(0.3) U	(0.3) U	(0.6) U	(0.7) U	(1) U
1,1-Dichloroethane	75-34-3	50	(0.50) U	(1.4) U	(0.5) U	(0.2) U	(0.2) U	(0.7) U	(0.6) U	(1) U
1,1-Dichloroethylene	75-35-4	2	0.7	(1.4) U	(0.9) U	0.7	0.5	(0.7) U	1.9	1.4
1,2-Dichloroethane	107-06-2	2	(0.70) U	(1.8) U	(0.5) U	(0.3) U	(0.3) U	(0.7) U	(0.6) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.70) U	(1.8) U	(0.5) U	(0.2) U	(0.2) U	(0.7) U	(0.6) U	(1) U
Carbon tetrachloride	56-23-5	2	(0.60) U	(1.5) U	(0.4) U	(0.2) U	(0.2) U	(0.6) U	(0.6) U	(1) U
Chloroethane	75-00-3	100	(1.0) U	(2.4) U	(0.9) U	(0.5) U	(0.5) U	(0.7) U	(0.5) U	(1) U
cis-1,2-Dichloroethene	156-59-2	70	310	290	250	96	110	170	380	151
Methylene Chloride	75-09-2	3	(1.8) U	(4.4) U	(1.6) U	(0.8) U	(0.8) U	1.8	(1) U	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	0.6	(1.2) U	(0.5) U	0.7	0.5	1.3	2.9	1.9
Tetrachloroethene	127-18-4	1	3.4	(1.2) U	2	1	0.5	(0.7) U	3.9	1.6
Trichloroethylene	79-01-6	1	11	(0.6) U	4	1.3	1.3	0.8	4.7	2.4
Vinyl Chloride	75-01-4	5	77	84	56	52	50	82	73	91.1
Total VOCs	--	--	402.7	374	312	151.7				

NOTES:

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TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			RW09B									
Lab ID			569992	347414	383799	423961	463806	517949	569993	625785	676759	J29360-42
Depth			90	147	118	118	118	118	118	118	118	118
Sample Date			10/04/04	04/29/02	10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/19/05	10/11/05	05/02/06
Sample Time			15:15	12:05	14:30	12:15	14:40	15:20	15:20	15:32	14:05	14:40
VOCs via EPA Method 624 ¹	CAS_RN	GWQS										
1,1,1-Trichloroethane	71-55-6	30	(0.3) U	(0.50) U	(1.3) U	(0.8) U	(0.2) U	(0.2) U	(0.3) U	(0.6) U	(1.7) U	(1) U
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.60) U	(1.4) U	(1.7) U	(0.3) U	(0.3) U	(0.3) U	(0.6) U	(1.6) U	(1) U
1,1-Dichloroethane	75-34-3	50	(0.4) U	(0.50) U	(1.4) U	(1.2) U	(0.2) U	(0.2) U	(0.4) U	(0.7) U	(1.6) U	(1) U
1,1-Dichloroethylene	75-35-4	2	0.4	(0.60) U	(1.4) U	(2.2) U	1	0.8	0.5	(0.7) U	(1.8) U	1.3
1,2-Dichloroethane	107-06-2	2	(0.4) U	(0.70) U	(1.8) U	(1.3) U	(0.3) U	(0.3) U	(0.4) U	(0.7) U	(1.4) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.4) U	(0.70) U	(1.8) U	(1.2) U	(0.2) U	(0.2) U	(0.4) U	(0.7) U	(1.4) U	(1) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.60) U	(1.5) U	(1) U	(0.2) U	(0.2) U	(0.3) U	(0.6) U	(1.6) U	(1) U
Chloroethane	75-00-3	100	(0.4) U	(1.0) U	(2.4) U	(2.3) U	(0.5) U	(0.5) U	(0.4) U	(0.7) U	(1.2) U	(1) U
cis-1,2-Dichloroethene	156-59-2	70	120	260	420	320	160	190	140	190	330	165
Methylene Chloride	75-09-2	3	(0.9) U	(1.8) U	(4.4) U	(4) U	(0.8) U	(0.8) U	(0.9) U	(1.8) U	(2.6) U	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.3) U	0.8	(1.2) U	(1.2) U	0.8	0.8	0.4	2.2	4.6	1.5
Tetrachloroethene	127-18-4	1	0.4	2.6	(1.2) U	1.9	1.7	1	0.5	(0.7) U	4.2	2
Trichloroethylene	79-01-6	1	1	7.6	(0.6) U	4.4	2.7	2.6	1.4	1.6	4.8	2.3
Vinyl Chloride	75-01-4	5	63	71	94	70	65	66	69	87	66	50.8
Total VOCs	--	--			514	396.3	231.2	261.2	211.8	280.8	409.6	222.9

NOTES:

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TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			RW09C									
Lab ID			347415	383800	423962	463807	517950	569994	625786	676760	J29360-43	
Depth			160	147	147	147	147	147	147	147	147	
Sample Date			04/29/02	10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/19/05	10/11/05	05/02/06	
Sample Time			12:10	14:35	12:20	14:45	15:25	15:22	15:37	14:10	14:45	
VOCs via EPA Method 624 ¹	CAS_RN	GWQS										
1,1,1-Trichloroethane	71-55-6	30	(0.3) U	(1.3) U	(0.8) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(1.7) U	(1) U	
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(1.4) U	(1.7) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(1.6) U	(1) U	
1,1-Dichloroethane	75-34-3	50	(0.3) U	(1.4) U	(1.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(1.6) U	(1) U	
1,1-Dichloroethylene	75-35-4	2	0.4	(1.4) U	(2.2) U	0.8	0.6	0.4	0.7	2.2	1.5	
1,2-Dichloroethane	107-06-2	2	(0.40) U	(1.8) U	(1.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(1.4) U	(1) U	
1,2-Dichloropropane	78-87-5	1	(0.40) U	(1.8) U	(1.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(1.4) U	(1) U	
Carbon tetrachloride	56-23-5	2	(0.3) U	(1.5) U	(1) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(1.6) U	(1) U	
Chloroethane	75-00-3	100	(0.50) U	(2.4) U	(2.3) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(1.2) U	(1) U	
cis-1,2-Dichloroethene	156-59-2	70	140	390	300	140	150	130	170	370	173	
Methylene Chloride	75-09-2	3	(0.90) U	(4.4) U	(4) U	(0.8) U	(0.8) U	(0.9) U	(0.9) U	(2.6) U	(1) U	
Trans-1,2-Dichloroethene	156-60-5	100	0.8	(1.2) U	(1.2) U	0.9	0.6	0.4	0.8	2.2	2.5	
Tetrachloroethene	127-18-4	1	0.3	(1.2) U	1.6	1.3	0.6	(0.4) U	0.4	(2.2) U	1.4	
Trichloroethylene	79-01-6	1	2.1	(0.6) U	6.2	3	1.5	1.2	1.3	2.6	2.4	
Vinyl Chloride	75-01-4	5	180	110	78	72	85	72	130	79	71.3	
Total VOCs	--	--	323.6	500	385.8	218	238.3	204	303.2	456	252.1	

NOTES:

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Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			RW09D									
Lab ID			347416	383801	423963	463808	517951	569995	625787	676761	J29360-44	
Depth			188	160	160	160	160	160	160	160	160	
Sample Date			04/29/02	10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/19/05	10/11/05	05/02/06	
Sample Time			12:15	14:40	12:25	14:50	15:30	15:25	15:42	14:15	14:50	
VOCs via EPA Method 624 ¹	CAS_RN	GWQS										
1,1,1-Trichloroethane	71-55-6	30	(1.3) U	(1.3) U	(0.3) U	(0.8) U	(0.2) U	(0.3) U	(0.3) U	(0.7) U	(1) U	
1,1,2-Trichloroethane	79-00-5	3	(1.4) U	(1.4) U	(0.7) U	(1.7) U	(0.3) U	(0.3) U	(0.3) U	(0.7) U	(1) U	
1,1-Dichloroethane	75-34-3	50	(1.4) U	(1.4) U	(0.5) U	(1.2) U	(0.2) U	(0.4) U	(0.4) U	(0.6) U	(1) U	
1,1-Dichloroethylene	75-35-4	2	(1.4) U	(1.4) U	(0.9) U	(2.2) U	0.6	(0.3) U	(0.3) U	(0.7) U	0.83 J	
1,2-Dichloroethane	107-06-2	2	(1.8) U	(1.8) U	(0.5) U	(1.3) U	(0.3) U	(0.4) U	(0.4) U	(0.6) U	(1) U	
1,2-Dichloropropane	78-87-5	1	(1.8) U	(1.8) U	(0.5) U	(1.2) U	(0.2) U	(0.4) U	(0.4) U	(0.6) U	(1) U	
Carbon tetrachloride	56-23-5	2	(1.5) U	(1.5) U	(0.4) U	(1) U	(0.2) U	(0.3) U	(0.3) U	(0.6) U	(1) U	
Chloroethane	75-00-3	100	(2.4) U	(2.4) U	(0.9) U	(2.3) U	(0.5) U	(0.4) U	(0.4) U	(0.5) U	(1) U	
cis-1,2-Dichloroethene	156-59-2	70	27	140	59	44	140	30	140	55	141	
Methylene Chloride	75-09-2	3	(4.4) U	(4.4) U	(1.6) U	(4) U	(0.8) U	(0.9) U	(0.9) U	(1) U	(1) U	
Trans-1,2-Dichloroethene	156-60-5	100	(1.2) U	(1.2) U	(0.5) U	(1.2) U	0.8	(0.3) U	0.8	(0.9) U	1.8	
Tetrachloroethene	127-18-4	1	(1.2) U	(1.2) U	1.3	(1.6) U	(0.3) U	(0.4) U	(0.4) U	(0.4) U	(1) U	
Trichloroethylene	79-01-6	1	(0.60) U	(0.6) U	0.7	(0.9) U	0.5	(0.4) U	0.7	(0.7) U	(1) U	
Vinyl Chloride	75-01-4	5	330	350	300	280	120	150	160	160	169	
Total VOCs	--	--	357	490	361	324	261.9	180	301.5	215	311.8	

NOTES:

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Phillipsburg, New Jersey

Sample ID			RW09E								RW09EP
Lab ID			383802	423964	463809	517952	569996	625788	676762	J29360-45	676763
Depth			193	188	188	188	188	188	188	188	188
Sample Date			10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/19/05	10/11/05	05/02/06	10/11/05
Sample Time			14:45	12:30	14:55	15:35	15:28	15:47	14:20	14:55	14:25
VOCs via EPA Method 624 ¹	CAS_RN	GWQS									
1,1,1-Trichloroethane	71-55-6	30	(0.5) U	(0.3) U	(0.8) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U	(0.3) U
1,1,2-Trichloroethane	79-00-5	3	(0.6) U	(0.7) U	(1.7) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(1) U	(0.3) U
1,1-Dichloroethane	75-34-3	50	(0.5) U	(0.5) U	(1.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U	(0.3) U
1,1-Dichloroethylene	75-35-4	2	(0.6) U	3.1	(2.2) U	0.5	(0.3) U	0.6	(0.4) U	(1) U	(0.4) U
1,2-Dichloroethane	107-06-2	2	(0.7) U	(0.5) U	(1.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U	(0.3) U
1,2-Dichloropropane	78-87-5	1	(0.7) U	(0.5) U	(1.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U	(0.3) U
Carbon tetrachloride	56-23-5	2	(0.6) U	(0.4) U	(1) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U	(0.3) U
Chloroethane	75-00-3	100	(1) U	(0.9) U	(2.3) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U	(0.2) U
cis-1,2-Dichloroethene	156-59-2	70	75	320	(1.2) U	130	0.7	140	12	1.1	13
Methylene Chloride	75-09-2	3	(1.8) U	(1.6) U	(4) U	(0.8) U	(0.9) U	(0.9) U	(0.5) U	(1) U	(0.5) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.5) U	1	(1.2) U	0.6	(0.3) U	0.8	(0.4) U	(1) U	(0.4) U
Tetrachloroethene	127-18-4	1	1.4	1.9	(1.6) U	(0.3) U	(0.4) U	(0.4) U	(0.4) U	(1) U	(0.4) U
Trichloroethylene	79-01-6	1	1.7	2.6	(0.9) U	0.6	(0.4) U	0.7	0.8	(1) U	0.8
Vinyl Chloride	75-01-4	5	200	350	380	110	160	160	93	14.6	95
Total VOCs	--	--	278.1	678.6	380	241.7	160.7	302.1	105.8	15.7	108.8

NOTES:

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Sample IDs ending in "P" indicate that it is a duplicate sample.

CAS_RN = Chemical Abstracts Service Registry Number.

¹ The analytes presented include only these for which at least on

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Detection Limit (MDL) shown in parenthesis.

ND = Not Detected.

Bold indicates that the concentration exceeds the NJDEP GWQS.

TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			RW11A							
Lab ID			383803	423972	463796	517935	569982	625756	676729	J29228-31
Depth			115	115	115	115	115	115	115	115
Sample Date			10/16/02	04/23/03	09/23/03	04/06/04	10/04/04	04/19/05	10/10/05	05/01/06
Sample Time			7:35	15:45	12:25	14:00	13:25	9:30	14:30	13:10
VOCs via EPA Method 624 ¹	CAS_RN	GWQS								
1,1,1-Trichloroethane	71-55-6	30	0.7	(0.2) U	0.4	0.3	(0.3) U	0.4	0.5	(1) U
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(1) U
1,1-Dichloroethane	75-34-3	50	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U
1,1-Dichloroethylene	75-35-4	2	(0.3) U	(0.4) U	(0.4) U	(0.4) U	(0.3) U	(0.3) U	(0.4) U	(1) U
1,2-Dichloroethane	107-06-2	2	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U
Chloroethane	75-00-3	100	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U
cis-1,2-Dichloroethene	156-59-2	70	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.4) U	(1) U
Methylene Chloride	75-09-2	3	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U	(0.9) U	(0.5) U	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.4) U	(1) U
Tetrachloroethene	127-18-4	1	1.9	1.2	1.3	1.1	1	1.6	2.7	2.6
Trichloroethylene	79-01-6	1	(0.1) U	(0.2) U	0.3	0.3	(0.4) U	(0.4) U	(0.4) U	0.29
Vinyl Chloride	75-01-4	5	(0.3) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.3) U	(2) U
Total VOCs	--	--	2.6	1.2	2	1.7	1	2	3.2	2.89

NOTES:

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TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			RW11B							
Lab ID			383803	423972	463796	517935	569982	625757	676730	J29228-31
Depth			170	170	170	170	170	170	170	170
Sample Date			10/16/02	04/23/03	09/23/03	04/06/04	10/04/04	04/19/05	10/10/05	05/01/06
Sample Time			7:40	15:50	12:30	14:05	11:35	9:35	14:34	13:15
VOCs via EPA Method 624 ¹	CAS_RN	GWQS								
1,1,1-Trichloroethane	71-55-6	30	(0.3) U	0.3	0.3	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(1) U
1,1-Dichloroethane	75-34-3	50	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	0.5	0.3	(1) U
1,1-Dichloroethylene	75-35-4	2	0.7	(0.4) U	0.8	0.7	0.6	0.9	0.6	0.7 J
1,2-Dichloroethane	107-06-2	2	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U
Chloroethane	75-00-3	100	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U
cis-1,2-Dichloroethene	156-59-2	70	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.4) U	(1) U
Methylene Chloride	75-09-2	3	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U	(0.9) U	(0.5) U	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.4) U	(1) U
Tetrachloroethene	127-18-4	1	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.4) U	(1) U
Trichloroethylene	79-01-6	1	(0.1) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.4) U	(1) U
Vinyl Chloride	75-01-4	5	(0.3) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.3) U	(2) U
Total VOCs	--	--	0.7	0.3	1.1	0.7	0.6	1.4	0.9	0

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TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			RW14A							RW14B				
Lab ID			383789	423956	463788	517929	569970	625391	J29360-15	383790	423957	463789	517930	569971
Depth			118	118	118	118	118	164.5	140	155	165	165	165	165
Sample Date			10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/18/05	05/02/06	10/15/02	04/23/03	09/23/03	04/06/04	10/04/04
Sample Time			11:10	11:30	11:25	12:15	11:25	14:00	9:15	11:15	11:35	11:30	12:20	11:35
VOCs via EPA Method 624 ¹	CAS_RN	GWQS												
1,1,1-Trichloroethane	71-55-6	30	7	2	1.5	1.2	1	1	4.3	6.7	2.8	4	3.5	4.2
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(1) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U
1,1-Dichloroethane	75-34-3	50	12	6.7	5.7	4.2	3.5	3.8	7.6	12	4.9	7	6.9	8.5
1,1-Dichloroethylene	75-35-4	2	3	0.9	1.3	0.8	0.8	0.7	1.7	2.6	0.9	1.9	1.7	1.8
1,2-Dichloroethane	107-06-2	2	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(1) U	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U
1,2-Dichloropropane	78-87-5	1	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(1) U	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(1) U	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U
Chloroethane	75-00-3	100	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(1) U	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U
cis-1,2-Dichloroethene	156-59-2	70	3.8	2.2	2.2	1.4	1	1.4	1.3	4.2	2.1	3.6	2.4	2.4
Methylene Chloride	75-09-2	3	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U	(0.9) U	(1) U	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(1) U	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U
Tetrachloroethene	127-18-4	1	0.4	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	0.43 J	0.3	(0.3) U	0.4	(0.3) U	(0.4) U
Trichloroethylene	79-01-6	1	2.1	0.8	0.8	0.7	0.7	0.8	1.2	2	0.8	1.5	1.5	1.7
Vinyl Chloride	75-01-4	5	(0.3) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(2) U	(0.3) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U
Total VOCs	--	--	28.3	12.6	11.5	8.3	7	7.7	16.1	27.8	11.5	18.4	16	18.6

NOTES:

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Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			RW15A									
Lab ID				347427	383795	423967	463798	517941	RW15A	625772	676752	J29360-28
Depth				113	113	113	113	113	113	113	113	113
Sample Date				04/29/02	10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/19/05	10/11/05	05/02/06
Sample Time				10:30	13:55	14:10	13:35	14:35	13:40	12:55	13:20	12:35
VOCs via EPA Method 624 ¹	CAS_RN	GWQS										
1,1,1-Trichloroethane	71-55-6	30	1	2.6	1.8	1.5	1.2	0.8	0.8	0.9	1.1	
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(1) U	
1,1-Dichloroethane	75-34-3	50	3.6	3.5	0.9	0.7	0.6	(0.4) U	(0.4) U	0.6	(1) U	
1,1-Dichloroethylene	75-35-4	2	(0.3) U	(0.3) U	(0.4) U	0.6	(0.4) U	(0.3) U	(0.3) U	(0.4) U	(1) U	
1,2-Dichloroethane	107-06-2	2	(0.40) U	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U	
1,2-Dichloropropane	78-87-5	1	(0.40) U	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U	
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U	
Chloroethane	75-00-3	100	(0.50) U	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U	
cis-1,2-Dichloroethene	156-59-2	70	7.2	58	12	7.6	4	3.5	1.1	4.6	5.6	
Methylene Chloride	75-09-2	3	(0.90) U	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U	0.9	(0.5) U	(1) U	
Trans-1,2-Dichloroethene	156-60-5	100	(0.20) U	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	0.3	(0.4) U	(1) U	
Tetrachloroethene	127-18-4	1	0.7	2.5	7.9	9.6	7.1	4.5	2.9	1.8	5.7	
Trichloroethylene	79-01-6	1	3.1	12	5.7	4.1	2.9	1.7	0.9	1.8	2.9	
Vinyl Chloride	75-01-4	5	7.3	(0.3) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.3) U	(2) U	
Total VOCs	--	--	22.9	78.6	28.3	24.1	15.8	10.5	6.9	9.7	15.3	

NOTES:

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Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			RW15B								
Lab ID			347408	383796	423968	463799	517942	569985	625773	676753	J29360-29
Depth			128	135	135	135	135	135	135	135	135
Sample Date			04/29/02	10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/19/05	10/11/05	05/02/06
Sample Time			10:35	14:00	14:15	13:40	14:40	13:45	13:00	13:25	12:40
VOCs via EPA Method 624 ¹	CAS_RN	GWQS									
1,1,1-Trichloroethane	71-55-6	30	1	1.3	1.8	1.6	1	0.9	0.7	1	1.1
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(1) U
1,1-Dichloroethane	75-34-3	50	3.8	3.6	(0.2) U	0.8	(0.2) U	0.4	(0.4) U	0.7	(1) U
1,1-Dichloroethylene	75-35-4	2	(0.3) U	(0.3) U	(0.4) U	0.5	(0.4) U	(0.3) U	(0.3) U	(0.4) U	(1) U
1,2-Dichloroethane	107-06-2	2	(0.40) U	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.40) U	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U
Chloroethane	75-00-3	100	(0.50) U	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U
cis-1,2-Dichloroethene	156-59-2	70	8	12	13	8.9	4.1	4.8	1	7.2	5.7
Methylene Chloride	75-09-2	3	(0.90) U	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U	(0.9) U	(0.5) U	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.20) U	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.4) U	(1) U
Tetrachloroethene	127-18-4	1	0.9	2.7	6.5	7.4	3.3	2.8	1.5	1.8	4.3
Trichloroethylene	79-01-6	1	3.4	5.6	5.4	4.5	2.7	2.4	0.8	2.6	2.9
Vinyl Chloride	75-01-4	5	7.5	4.7	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	0.6	(2) U
Total VOCs	--	--	24.6	29.9	26.7	23.7	11.1	11.3	4	13.9	14

NOTES:

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TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			RW15C										RW15D
Lab ID			347409	383797	423969	463800	517943	569986	625774	676754	J29360-30		347410
Depth			142	156	156	155	155	156	156	156	156		156
Sample Date			04/29/02	10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/19/05	10/11/05	05/02/06		04/29/02
Sample Time			10:40	14:05	14:20	13:45	14:45	13:50	13:05	13:30	12:45		10:45
VOCs via EPA Method 624 ¹	CAS_RN	GWQS											
1,1,1-Trichloroethane	71-55-6	30	1	1.4	1.8	1.8	1.1	0.8	0.7	1	1.1		0.9
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(1) U		(0.3) U
1,1-Dichloroethane	75-34-3	50	3.9	3.5	1	0.8	0.7	0.5	(0.4) U	0.9	(1) U		3.6
1,1-Dichloroethylene	75-35-4	2	(0.3) U	(0.3) U	(0.4) U	0.6	(0.4) U	(0.3) U	(0.3) U	(0.4) U	(1) U		(0.3) U
1,2-Dichloroethane	107-06-2	2	(0.40) U	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U		(0.40) U
1,2-Dichloropropane	78-87-5	1	(0.40) U	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U		(0.40) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U		(0.3) U
Chloroethane	75-00-3	100	(0.50) U	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U		(0.50) U
cis-1,2-Dichloroethene	156-59-2	70	8.2	15	12	9	4.3	5	1	7.4	5.6		7.7
Methylene Chloride	75-09-2	3	(0.90) U	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U	(0.9) U	(0.5) U	(1) U		(0.90) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.20) U	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.4) U	(1) U		(0.20) U
Tetrachloroethene	127-18-4	1	0.7	2.3	5.3	4.9	3.5	2.5	1.8	2	4.5		0.8
Trichloroethylene	79-01-6	1	3.3	5.8	4.9	4.2	2.8	2.4	0.8	2.7	2.9		3.2
Vinyl Chloride	75-01-4	5	6.8	2.8	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.3) U	(2) U		7.6
Total VOCs	--	--	23.9	30.8	25	21.3	12.4	11.2	4.3	14	14.1		23.8

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Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			RW16A							
Lab ID			347411	383793	423970	463803	517944	569987	625775	676755 J29360-46
Depth			121	121	121	121	121	121	121	121
Sample Date			04/29/02	10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/19/05	10/11/05 05/02/06
Sample Time			11:35	13:15	14:35	14:15	14:55	13:55	13:12	13:40 15:10
VOCs via EPA Method 624 ¹	CAS_RN	GWQS								
1,1,1-Trichloroethane	71-55-6	30	96	310	66	110	290	68	160	91 7.1
1,1,2-Trichloroethane	79-00-5	3	(2.8) U	8.1	(6.8) U	(3.4) U	5.2	(2.8) U	4	(3.3) U (1) U
1,1-Dichloroethane	75-34-3	50	460	600	310	310	360	220	340	620 92.6
1,1-Dichloroethylene	75-35-4	2	14	33	70	16	26	9.8	24	21 4.4
1,2-Dichloroethane	107-06-2	2	18	25	48	24	(0.5) U	15	7.3	(2.9) U 22.1
1,2-Dichloropropane	78-87-5	1	(3.5) U	(3.5) U	(4.6) U	(2.3) U	(0.5) U	(3.7) U	(3.7) U	(2.9) U (1) U
Carbon tetrachloride	56-23-5	2	(3.0) U	(3) U	(3.8) U	(1.9) U	(0.4) U	(3) U	(3) U	(3.1) U (1) U
Chloroethane	75-00-3	100	1300	970	2600	1200	390	1100	790	840 1260
cis-1,2-Dichloroethene	156-59-2	70	(3.1) U	16	36	5.7	18	(3.5) U	16	8 (1) U
Methylene Chloride	75-09-2	3	(8.8) U	(8.8) U	(16) U	(8.1) U	(1.6) U	(9.1) U	(9.1) U	(5.1) U 1.1
Trans-1,2-Dichloroethene	156-60-5	100	(2.3) U	(2.3) U	(5) U	(2.5) U	(0.5) U	(3.3) U	3.3	4.3 (1) U
Tetrachloroethene	127-18-4	1	(2.4) U	(2.4) U	(6.2) U	(3.1) U	2.5	(3.6) U	(3.6) U	(4.5) U (1) U
Trichloroethylene	79-01-6	1	(1.2) U	(1.2) U	(3.6) U	(1.8) U	7.4	(4) U	9.6	(3.7) U 0.49 j
Vinyl Chloride	75-01-4	5	19	(2.9) U	(11) U	24	21	15	24	30 12.7
Total VOCs	--	--	1907	1962.1	3130	1689.7	1120.1	1427.8	1378.2	1614.3 1400

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TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			RW16B											
Lab ID			347412	383794	423971	463804	517945	569988	625776	676756	J29360-48	625777	676757	J29360-48
Depth			141.5	141.5	141.5	141.5	141.5	141.5	141.5	141.5	141.5	141.5	141.5	141.5
Sample Date			04/29/02	10/15/02	04/23/03	09/23/03	04/06/04	10/04/04	04/19/05	10/11/05	05/02/06	4/19/2005	10/11/2005	5/2/2006
Sample Time			11:40	13:20	14:40	14:20	15:05	14:00	13:17	13:45	15:15	13:20	13:50	15:20
VOCs via EPA Method 624 ¹	CAS_RN	GWQS												
1,1,1-Trichloroethane	71-55-6	30	88	400	51	110	170	78	87	49	2.4 J	130	44	2.5
1,1,2-Trichloroethane	79-00-5	3	(2.8) U	7.8	(8.5) U	(6.8) U	(3.4) U	(2.8) U	2.9	(1.6) U	(2.5) U	3.1	(1.6) U	(2.5) U
1,1-Dichloroethane	75-34-3	50	440	620	140	190	560	250	250	360	40.2	340	340	41.9
1,1-Dichloroethylene	75-35-4	2	12	40	55	(8.6) U	18	7.2	14	3.4	3.6	23	3.2	3.7
1,2-Dichloroethane	107-06-2	2	18	25	44	26	10	14	5.9	(1.4) U	13	7.1	8.3	14
1,2-Dichloropropane	78-87-5	1	(3.5) U	(3.5) U	(5.8) U	(4.6) U	(2.3) U	(3.7) U	(1.8) U	(1.4) U	(2.5) U	(3.7) U	(1.4) U	(2.5) U
Carbon tetrachloride	56-23-5	2	(3.0) U	(3) U	(4.8) U	(3.8) U	(1.9) U	(3) U	(1.5) U	(1.6) U	(2.5) U	(3) U	(1.6) U	(2.5) U
Chloroethane	75-00-3	100	1200	950	2600	2800	280	1000	450	320	940	740	280	1050
cis-1,2-Dichloroethene	156-59-2	70	(3.1) U	16	27	(4.8) U	8.4	(3.5) U	11	(2.2) U	(2.5) U	15	(2.2) U	(2.5) U
Methylene Chloride	75-09-2	3	(8.8) U	(8.8) U	(20) U	(16) U	(8.1) U	(9.1) U	12	(2.6) U	(2.1) U	(9.1) U	(2.6) U	(2.1) U
Trans-1,2-Dichloroethene	156-60-5	100	(2.3) U	(2.3) U	(6.2) U	(5) U	(2.5) U	(3.3) U	(1.6) U	(2.2) U	(2.5) U	(3.3) U	(2.2) U	(2.5) U
Tetrachloroethene	127-18-4	1	(2.4) U	(2.4) U	(7.8) U	(6.2) U	(3.1) U	(3.6) U	(1.8) U	(2.2) U	(2.5) U	(3.6) U	(2.2) U	(2.5) U
Trichloroethylene	79-01-6	1	(1.2) U	(1.2) U	(4.5) U	(3.6) U	11	(4) U	6.5	5.7	(2.5) U	8	5.1	(2.5) U
Vinyl Chloride	75-01-4	5	20	(2.9) U	49	(11) U	34	14	12	15	8.2	22	14	8
Total VOCs	--	--	1778	2058.8	2966	3126	1091.4	1363.2	851.3	753.1	1005	1288.2	694.6	1120.1

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Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			TH36A							
Lab ID			383805	423974	463810	517946	569989	625761	676721	J29360-16
Depth			110	110	110	110	110	110	110	110
Sample Date			10/16/02	04/23/03	09/23/03	04/06/04	10/04/04	4/19/2005	#####	5/2/2006
Sample Time			8:50	16:20	15:05	15:00	14:30	10:20	13:30	9:25
VOCs via EPA Method 624 ¹	CAS_RN	GWQS								
1,1,1-Trichloroethane	71-55-6	30	1.6	2.4	2.4	2	2.5	1.8	2.8	2.7
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(1) U
1,1-Dichloroethane	75-34-3	50	1.9	5.4	4.3	1.9	4	2	1.6	1
1,1-Dichloroethylene	75-35-4	2	0.4	(0.4) U	(0.4) U	(0.4) U	(0.3) U	(0.3) U	(0.4) U	(1) U
1,2-Dichloroethane	107-06-2	2	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U	(1) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U	(1) U
Chloroethane	75-00-3	100	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U	(1) U
cis-1,2-Dichloroethene	156-59-2	70	1.2	0.9	1.6	2.8	(0.4) U	29	2.3	1.3
Methylene Chloride	75-09-2	3	(0.9) U	(0.8) U	(0.8) U	(0.8) U	(0.9) U	(0.9) U	(0.5) U	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.4) U	(1) U
Tetrachloroethene	127-18-4	1	0.6	0.4	0.7	1	0.4	6.8	1.1	0.78 J
Trichloroethylene	79-01-6	1	0.5	0.4	0.6	1	(0.4) U	4.7	0.8	0.52 J
Vinyl Chloride	75-01-4	5	(0.3) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.3) U	(2) U
Total VOCs	--	--	6.2	9.5	9.6	8.7	6.9	44.3	8.6	5

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Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			TH36P			THWLSA					
Lab ID			383811	463811	517947	423965	463801	517933	569990	625769	J29360-17
Depth			110	110	110	110	110	110	110	110	104
Sample Date			10/16/02	09/23/03	04/06/04	04/23/03	09/23/03	04/06/04	10/04/04	04/19/05	05/02/06
Sample Time			8:55	15:10	15:50	13:50	14:00	12:45	14:52	11:39	9:40
VOCs via EPA Method 624 ¹	CAS_RN	GWQS									
1,1,1-Trichloroethane	71-55-6	30	1.7	2.2	2	86	120	140	31	14	66.8
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.7) U	(1.7) U	1.1	(0.6) U	(0.3) U	(1) U
1,1-Dichloroethane	75-34-3	50	2.2	4.1	1.9	260	280	280	120	18	128
1,1-Dichloroethylene	75-35-4	2	0.4	(0.4) U	0.5	12	19	23	6.4	1	9
1,2-Dichloroethane	107-06-2	2	(0.4) U	(0.3) U	(0.3) U	1.4	1.6	(0.5) U	(0.7) U	(0.4) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.4) U	(0.2) U	(0.2) U	(0.5) U	(1.2) U	(0.5) U	(0.7) U	(0.4) U	(1) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.2) U	(0.2) U	(0.4) U	(1) U	(0.4) U	(0.6) U	(0.3) U	(1) U
Chloroethane	75-00-3	100	(0.5) U	(0.5) U	(0.5) U	81	94	64	22	3.2	4.5
cis-1,2-Dichloroethene	156-59-2	70	1.1	1.6	2.9	4.6	6.2	5.3	1.4	(0.4) U	1.3
Methylene Chloride	75-09-2	3	(0.9) U	(0.8) U	(0.8) U	(1.6) U	(4) U	(1.6) U	(1.8) U	(0.9) U	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.2) U	(0.2) U	(0.2) U	(0.5) U	(1.2) U	(0.5) U	(0.7) U	(0.3) U	(1) U
Tetrachloroethene	127-18-4	1	0.7	0.6	1.2	(0.6) U	(1.6) U	(0.6) U	(0.7) U	(0.4) U	0.36 J
Trichloroethylene	79-01-6	1	0.5	0.5	1	2.7	4.4	4.8	(0.8) U	(0.4) U	2
Vinyl Chloride	75-01-4	5	(0.3) U	(0.5) U	(0.5) U	4.7	14	11	4.3	(0.4) U	1.4 J
Total VOCs	--	--	6.6	9	9.5	452.4	539.2	529.2	185.1	36.2	211.6

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Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Sample ID			THWLSAP	THWLSB				THWLSC	THWLSD
Lab ID			625770	423966	463802	517934	J29360-18	J29360-19	J29360-20
Depth			110	123	123	123	110	116	123
Sample Date			04/19/05	04/23/03	09/23/03	04/06/04	05/02/06	05/02/06	05/02/06
Sample Time			11:44	13:55	14:05	12:50	9:45	9:50	9:55
VOCs via EPA Method 624 ¹	CAS_RN	GWQS							
1,1,1-Trichloroethane	71-55-6	30	14	58	35	120	70.6	73.6	96.2
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(1.7) U	(0.7) U	1.2	(1) U	(1) U	(1) U
1,1-Dichloroethane	75-34-3	50	18	250	230	310	138	145	188
1,1-Dichloroethylene	75-35-4	2	1	16	14	23	12.1	12.3	18.5
1,2-Dichloroethane	107-06-2	2	(0.4) U	(1.3) U	2.4	(0.5) U	(1) U	(1) U	(1) U
1,2-Dichloropropane	78-87-5	1	(0.4) U	(1.2) U	(0.5) U	(0.5) U	(1) U	(1) U	(1) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(1) U	(0.4) U	(0.4) U	(1) U	(1) U	(1) U
Chloroethane	75-00-3	100	3.1	100	87	51	5.7	6.6	16.1
cis-1,2-Dichloroethene	156-59-2	70	(0.4) U	5.8	6.5	4.7	1.7	1.7	2.7
Methylene Chloride	75-09-2	3	(0.9) U	(4) U	(1.6) U	(1.6) U	(1) U	(1) U	(1) U
Trans-1,2-Dichloroethene	156-60-5	100	(0.3) U	(1.2) U	(0.5) U	(0.5) U	(1) U	(1) U	(1) U
Tetrachloroethene	127-18-4	1	(0.4) U	(1.6) U	(0.6) U	(0.6) U	0.48 J	0.36 J	0.43 J
Trichloroethylene	79-01-6	1	(0.4) U	2.7	2.6	4.6	2.5	2.5	3.3
Vinyl Chloride	75-01-4	5	(0.4) U	16	26	14	1.8 J	1.9 J	7
Total VOCs	--	--	36.1	448.5	403.5	528.5	230.6	241.7	331.8

NOTES:

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ND = Not Detected.

Bold indicates that the concentration exceeds the NJDEP GWQS.

TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Field ID			MW02A					MW02AP	MW04
Lab ID			348228	424612	465533	522751	576532	522753	348654
Sample Date			5/2/2002	4/25/2003	9/25/2003	4/23/2004	10/21/2004	4/23/2004	5/6/2002
Sample Time			10:20	10:15	15:20	12:15	13:45	12:20	12:10
VOCs via EPA Method 624 ¹	CAS_RN	GWQS							
1,1,1-Trichloroethane	71-55-6	30	25	19	12	8.4	5.1	8.6	1.2
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U
1,1-Dichloroethane	75-34-3	50	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.2) U	3.4
1,1-Dichloroethylene	75-35-4	2	4.6	2.1	1.4	1.2	0.6	1.5	0.7
1,2-Dichloroethane	107-06-2	2	(0.3) U	(0.3) U	(0.2) U	(0.3) U	(0.4) U	(0.2) U	(0.4) U
1,2-Dichloropropane	78-87-5	1	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.2) U	(0.4) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.2) U	(0.3) U
Chloroethane	75-00-3	100	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.5) U	(0.5) U
cis-1,2-Dichloroethene	156-59-2	70	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.2) U	97
trans-1,2-Dichloroethene	156-60-5	100	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.2) U	0.5
Tetrachloroethene	127-18-4	1	0.9	0.8	0.5	0.6	(0.4) U	0.6	14
Trichloroethylene	79-01-6	1	0.6	0.6	0.4	0.4	(0.4) U	0.4	31
Vinyl Chloride	75-01-4	5	(0.3) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.5) U	34
Total VOCs	--	--	31.1	22.5	14.3	10.6	5.7	11.1	181.8

NOTES:

All results are reported in micrograms per liter (ug/L).

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Sample IDs ending in "P" indicate that it is a duplicate sample.

CAS_RN = Chemical Abstracts Service Registry Number.

¹ The analytes presented include only those for which at least one analytical results reported a concentration in excess of the NJDEP Groundwater Quality Standards (GWQS).

U - Indicates that the analyte was not detected at the Method

Detection Limit (MDL) shown in parenthesis.

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TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Field ID			MW06			MW15						
Lab ID			349141	424934	465853	349626	424614	468969	518880	574575	628170	679277
Sample Date			5/7/2002	4/28/2003	9/29/2003	5/10/2002	4/25/2003	10/6/2003	4/9/2004	10/18/2004	4/26/2005	10/20/2005
Sample Time			13:25	11:40	16:10	11:15	15:10	11:15	12:15	15:30	11:50	14:05
VOCs via EPA Method 624 ¹	CAS_RN	GWQS										
1,1,1-Trichloroethane	71-55-6	30	17	140	80	3.8	2.8	1.7	2.6	3.5	3.3	6.4
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U
1,1-Dichloroethane	75-34-3	50	4.3	49	26	5	3.2	1.8	3.5	5.8	4.8	11
1,1-Dichloroethylene	75-35-4	2	3	7.4	4.7	1.3	0.7	(0.4) U	0.7	1.2	1	2.1
1,2-Dichloroethane	107-06-2	2	(0.4) U	(0.3) U	(0.3) U	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.3) U
1,2-Dichloropropane	78-87-5	1	(0.4) U	(0.2) U	(0.2) U	(0.4) U	(0.2) U	(0.2) U	(0.2) U	(0.4) U	(0.4) U	(0.3) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.2) U	(0.2) U	(0.3) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.3) U
Chloroethane	75-00-3	100	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.2) U
cis-1,2-Dichloroethene	156-59-2	70	(0.3) U	(0.2) U	(0.2) U	5.7	3.3	1.4	2.8	3.9	2.5	3.8
trans-1,2-Dichloroethene	156-60-5	100	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.3) U	(0.3) U	(0.2) U
Tetrachloroethene	127-18-4	1	0.4	3	2	1.2	0.6	(0.3) U	0.5	0.9	0.8	1.2
Trichloroethylene	79-01-6	1	1.9	12	6.6	1.5	0.8	0.4	0.8	1	0.9	1.5
Vinyl Chloride	75-01-4	5	(0.3) U	(0.5) U	(0.5) U	(0.3) U	(0.5) U	(0.5) U	(0.5) U	(0.4) U	(0.4) U	(0.3) U
Total VOCs	--	--	26.6	211.4	119.3	18.5	11.4	5.3	10.9	16.3	13.3	26

NOTES:

All results are reported in micrograms per liter (ug/L).

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¹ The analytes presented include only these for which at least on analytical results reported a concentration in excess of the NJDEP Groundwater Quality Standards (GWQS).

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Detection Limit (MDL) shown in parenthesis.

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Bold indicates that the concentration exceeds the NJDEP GWQS.

TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Field ID			MW16	MW32		MW33A	MW34	MW35	MW37	RW11
Lab ID			348496	349145	349146	348225	348226	348229	347681	349137
Sample Date			5/3/2002	5/8/2002	5/8/2002	5/1/2002	5/1/2002	5/2/2002	4/30/2002	5/8/2002
Sample Time			14:45	10:30	15:20	10:30	14:30	12:40	11:20	14:10
VOCs via EPA Method 624 ¹	CAS_RN	GWQS								
1,1,1-Trichloroethane	71-55-6	30	7.1	8.1	7.6	4.3	4.2	70	(0.3) U	(0.3) U
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U
1,1-Dichloroethane	75-34-3	50	6.2	14	14	(0.3) U	(0.3) U	19	(0.3) U	(0.3) U
1,1-Dichloroethylene	75-35-4	2	2.9	2.1	1.5	2.1	1.2	12	(0.3) U	(0.3) U
1,2-Dichloroethane	107-06-2	2	(0.4) U	(0.4) U	(0.4) U	(0.4) U	(0.4) U	(0.4) U	(0.4) U	(0.4) U
1,2-Dichloropropane	78-87-5	1	(0.4) U	(0.4) U	(0.4) U	(0.4) U	(0.4) U	(0.4) U	(0.4) U	(0.4) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	4.6	(0.3) U
Chloroethane	75-00-3	100	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.5) U	(0.5) U
cis-1,2-Dichloroethene	156-59-2	70	0.5	3.9	3.8	(0.3) U	6.1	1.4	(0.3) U	(0.3) U
trans-1,2-Dichloroethene	156-60-5	100	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.2) U
Tetrachloroethene	127-18-4	1	8.2	1.4	1.3	3.6	6.5	3.6	(0.20) U	4.9
Trichloroethylene	79-01-6	1	1.3	2.4	2.1	3.8	7.1	9.2	42	(0.10) U
Vinyl Chloride	75-01-4	5	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U
Total VOCs	--	--	26.2	31.9	30.3	13.8	25.1	115.2	46.6	4.9

NOTES:

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Detection Limit (MDL) shown in parenthesis.

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TABLE 1
Historical Groundwater Analytical Summary from April 2002 to Present
Former Ingersoll Rand Facility
Phillipsburg, New Jersey

Field ID			RW13			RW13P	RW14	RW15	TH36	THWLS
Lab ID			348495	629041	679273	629042	349625	387208	349616	386607
Sample Date			5/3/2002	4/28/2005	10/19/2005	4/28/2005	5/10/2002	10/30/2002	5/9/2002	10/28/2002
Sample Time			15:18	12:10	17:45	12:15	9:30	8:40	13:55	10:35
VOCs via EPA Method 624 ¹	CAS_RN	GWQS								
1,1,1-Trichloroethane	71-55-6	30	2.8	4.8	2.9	4.7	5.1	2.1	2.3	5.5
1,1,2-Trichloroethane	79-00-5	3	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U
1,1-Dichloroethane	75-34-3	50	1.5	(0.3) U	1	(0.3) U	8.9	1.2	2.3	140
1,1-Dichloroethylene	75-35-4	2	0.8	1.3	0.8	1.4	(0.3) U	0.4	0.6	4.4
1,2-Dichloroethane	107-06-2	2	(0.4) U	1.8	(0.3) U	1.9	(0.4) U	(0.4) U	(0.4) U	(0.7) U
1,2-Dichloropropane	78-87-5	1	(0.4) U	(0.3) U	(0.3) U	(0.3) U	(0.4) U	(0.4) U	(0.4) U	(0.7) U
Carbon tetrachloride	56-23-5	2	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.6) U
Chloroethane	75-00-3	100	(0.5) U	(0.2) U	(0.2) U	(0.2) U	(0.5) U	(0.5) U	(0.5) U	35
cis-1,2-Dichloroethene	156-59-2	70	(0.3) U	(0.4) U	(0.4) U	(0.4) U	1.8	28	2.1	1.5
trans-1,2-Dichloroethene	156-60-5	100	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.2) U	(0.5) U
Tetrachloroethene	127-18-4	1	1.2	1.6	1.6	1.8	0.9	4.9	2.5	(0.5) U
Trichloroethylene	79-01-6	1	(0.10) U	0.6	(0.4) U	0.6	1.5	9	0.9	(0.2) U
Vinyl Chloride	75-01-4	5	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	(0.3) U	20
Total VOCs	--	--	6.3	10.1	6.3	10.4	18.2	45.6	10.7	206.4

NOTES:

All results are reported in micrograms per liter (µg/L).

VOCs = Volatile Organic Compounds.

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CAS_RN = Chemical Abstracts Service Registry Number.

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Table 2a
MNA Evaluation
2005 VOC Analytical Data
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

Field ID	MW02AA	MW03A	MW04A		MW04B		MW04C		MW06A	
Depth	120	115	96	96	108	108	120	120	110	110
Sample Date	4/18/2005	4/18/2005	10/4/2004	4/18/2005	10/4/2004	4/18/2005	10/4/2004	4/18/2005	10/4/2004	4/18/2005
VOLATILE ORGANIC COMPOUNDS (ug/L)										
1,1,1-Trichloroethane	3.7	1.1	0.5	0.8	0.3 U	0.9	0.5	0.9	43	46
1,1-Dichloroethane	0.4	2.9	1.2	0.5	1.3	0.6	1.2	1.1	11	12
Chloroethane	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Chloroform	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Benzene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Toluene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Total Xylenes	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Tetrachloroethene	0.4 U	0.4 U	7.7	0.4 U	8.1	0.4 U	7.8	5	0.8	1
Trichloroethylene	0.4 U	0.6	19	0.4	20	0.6	21	7.2	5.6	6.2
Trans-1,2-Dichloroethene	0.3 U	0.3 U	0.4	0.3 U	0.5	0.3 U	0.5	0.7	0.3 U	0.3 U
1,1-Dichloroethylene	0.8	0.3 U	0.6	0.3 U	0.6	0.3 U	0.6	0.4	4.3	4
cis-1,2-Dichloroethene	0.4 U	1	69	1.1	76	1.4	78	57	0.4 U	0.4 U
Vinyl Chloride	0.4 U	0.4 U	33	0.4 U	37	0.4 U	39	9.9	0.4 U	0.4 U
1,2-Dichloroethane	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Carbon tetrachloride	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Methylene Chloride	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U

Notes:

All results are reported in micrograms per liter (ug/L).

Depths are reported in feet (ft) below top of well casing.

Sample IDs ending in "P" indicate that it is a duplicate sample.

CAS_RN = Chemical Abstracts Service Registry Number

NJDEP GWQS = New Jersey Department of Environmental Protection Groundwater

Quality Standards

TICs = Tentatively Identified Compounds

U - Indicates that the analyte was not detected at the Method Detection Limit (MDL).

ND = Not Detected

Bold indicates that the concentration exceeds the NJDEP GWQS.

Underline indicates the MDL is greater

Table 2a
MNA Evaluation
2005 VOC Analytical Data
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

Field ID	MW06B		MW06C		MW12A		MW12B		MW13A	MW13B	MW16A		MW16AA	MW16B	
Depth	145	145	187	187	110	110	126	126	157	189	130	130	130	155	155
Sample Date	10/4/2004	4/18/2005	10/4/2004	4/18/2005	10/4/2004	4/19/2005	10/4/2004	4/19/2005	4/18/2005	4/18/2005	10/4/2004	4/19/2005	10/4/2004	10/4/2004	4/19/2005
VOLATILE ORGANIC COMPOUNDS (ug/L)															
1,1,1-Trichloroethane	43	45	16	39	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	5.3	11	5.6	5.6	10
1,1-Dichloroethane	12	12	4.1	11	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	4.5	3.5	4.5	4	4.2
Chloroethane	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Chloroform	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Benzene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Toluene	1.1	0.3 U	0.5	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.5	0.3 U	0.6	0.7	0.3 U
Total Xylenes	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Tetrachloroethene	0.7	0.7	0.4 U	0.7	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.9	5.5	0.9	1.5	6.7
Trichloroethylene	5.6	6	2.1	5.2	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4	1.5	0.5	0.7	2.7
Trans-1,2-Dichloroethene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1-Dichloroethylene	4.4	3.7	1.7	3.4	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	3.8	3.7	3.7	3.4	2.8
cis-1,2-Dichloroethene	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.6	0.4 U	0.4 U	1.5
Vinyl Chloride	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
1,2-Dichloroethane	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Carbon tetrachloride	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Methylene Chloride	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U

Notes:

All results are reported in micrograms per liter (ug/L).

Depths are reported in feet (ft) below top of well casing.

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Quality Standards

TICs = Tentatively Identified Compounds

U - Indicates that the analyte was not detected at the Method Detection Limit (MDL).

ND = Not Detected

Bold indicates that the concentration exceeds the NJDEP GWQS.

Underline indicates the MDL is greater than GWQS.

Table 2a
MNA Evaluation
2005 VOC Analytical Data
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

Field ID	MW16BP	MW16C		MW18A	MW19A	MW19B	MW20A	MW24A	MW26A	MW26B	MW27A
Depth	155	190	190	112	135	147	134	145	133	145	137
Sample Date	4/19/2005	10/4/2004	4/19/2005	4/19/2005	4/19/2005	4/19/2005	4/19/2005	4/19/2005	4/19/2005	4/19/2005	4/18/2005
VOLATILE ORGANIC COMPOUNDS (ug/L)											
1,1,1-Trichloroethane	10	4.4	9.9	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1-Dichloroethane	4.2	3.3	4.4	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Chloroethane	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Chloroform	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Benzene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Toluene	0.3 U	1.8	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Total Xylenes	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Tetrachloroethene	6.4	1.2	5.7	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Trichloroethylene	2.8	0.7	2.5	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Trans-1,2-Dichloroethene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1-Dichloroethylene	2.8	2.4	2.8	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
cis-1,2-Dichloroethene	1.5	0.4	1.5	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Vinyl Chloride	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
1,2-Dichloroethane	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Carbon tetrachloride	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Methylene Chloride	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U

Notes:

All results are reported in micrograms per liter (ug/L).

Depths are reported in feet (ft) below top of well casing.

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Table 2a
MNA Evaluation
2005 VOC Analytical Data
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

Field ID	MW30A	MW32A		MW32B		MW33AA		MW33AB		MW33AP A	MW34A	
Depth	75	118	118	129	129	107	107	120	120	107	108	108
Sample Date	4/19/2005	10/4/2004	4/18/2005	10/4/2004	4/18/2005	10/4/2004	4/18/2005	10/4/2004	4/18/2005	10/4/2004	10/4/2004	4/18/2005
VOLATILE ORGANIC COMPOUNDS (ug/L)												
1,1,1-Trichloroethane	0.3 U	4.7	3.9	4.9	3.6	3.5	3.2	2	1.9	3.4	1.7	2.3
1,1-Dichloroethane	0.4 U	8.8	7.2	8.8	6.9	0.6	0.6	0.5	0.5	0.5	0.4 U	0.4 U
Chloroethane	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Chloroform	0.3 U	0.4	0.4	0.4	0.4	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Benzene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Toluene	0.3 U	0.5	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Total Xylenes	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Tetrachloroethene	0.4 U	0.5	0.4 U	0.5	0.4 U	1.7	2.2	1.7	1.9	1.8	0.4	0.9
Trichloroethylene	0.4 U	1.7	1.3	1.8	1.2	4.7	4.2	2.8	2.5	4.6	1.3	2.3
Trans-1,2-Dichloroethene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1-Dichloroethylene	0.3 U	1.8	1.5	2	1.2	2.1	1.5	0.9	0.9	1.9	0.3 U	0.4
cis-1,2-Dichloroethene	0.4 U	2.5	1.7	2.6	1.7	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Vinyl Chloride	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
1,2-Dichloroethane	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Carbon tetrachloride	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Methylene Chloride	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U

Notes:

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Table 2a
MNA Evaluation
2005 VOC Analytical Data
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

Field ID	MW34B		MW34C		MW35A		MW35B		MW35BP	MW37A		MW37B		MW37C	
Depth	118	113	120	120	122	122	128	128	128	60	60	86	86	98	98
Sample Date	10/4/2004	4/18/2005	10/4/2004	4/18/2005	10/4/2004	4/18/2005	10/4/2004	4/18/2005	4/18/2005	10/4/2004	4/18/2005	10/4/2004	4/18/2005	10/4/2004	4/18/2005
VOLATILE ORGANIC COMPOUNDS (ug/L)															
1,1,1-Trichloroethane	1.7	2	1.7	2.4	93	130	53	70	74	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1-Dichloroethane	0.4 U	0.4 U	0.4 U	0.4 U	21	50	10	16	16	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Chloroethane	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.7 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Chloroform	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.7 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.4	0.3 U
Benzene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.6 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Toluene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.5 U	0.3 U	0.3 U	0.3 U	0.3	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Total Xylenes	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.4 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Tetrachloroethene	0.5	0.7	1.2	1.8	2.2	3.3	1.3	2	2	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Trichloroethylene	1.4	1.9	2.4	3.4	8.4	11	5.9	6	6.4	11	9.5	11	9.8	25	20
Trans-1,2-Dichloroethene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.7 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1-Dichloroethylene	0.3 U	0.3 U	0.4	0.6	6.6	5.7	4.4	4.6	4.2	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
cis-1,2-Dichloroethene	0.4 U	0.4	0.8	0.9	0.4	0.7 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Vinyl Chloride	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.7 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
1,2-Dichloroethane	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.7 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Carbon tetrachloride	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.6 U	0.3 U	0.3 U	0.3 U	0.8	0.8	0.7	0.9	2.5	1.9
Chloromethane	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.8 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Methylene Chloride	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	1.8 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U

Notes:

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Table 2a
MNA Evaluation
2005 VOC Analytical Data
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

Field ID	MW47A	MW48A	MW49A	MW50A	MW51AA	MW52A	MW52B	MW53A	MW53B	MW54A
Depth	136.5	132	54	152	133	109	170	127	161	120
Sample Date	4/19/2005	4/19/2005	4/19/2005	4/18/2005	4/18/2005	4/18/2005	4/18/2005	4/18/2005	4/18/2005	4/18/2005
VOLATILE ORGANIC COMPOUNDS (ug/L)										
1,1,1-Trichloroethane	0.3 U	0.3 U	0.3 U	0.8	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1-Dichloroethane	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Chloroethane	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Chloroform	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Benzene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Toluene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Total Xylenes	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Tetrachloroethene	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Trichloroethylene	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Trans-1,2-Dichloroethene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1-Dichloroethylene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
cis-1,2-Dichloroethene	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.5	0.4 U
Vinyl Chloride	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
1,2-Dichloroethane	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Carbon tetrachloride	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Methylene Chloride	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U

Notes:

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Table 2a
MNA Evaluation
2005 VOC Analytical Data
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

Field ID	RW09A		RW09B		RW09C		RW09D		RW09E		RW10A	RW11A	
Depth	90	90	118	118	147	147	160	160	188	188	170	115	115
Sample Date	10/4/2004	4/19/2005	10/4/2004	4/19/2005	10/4/2004	4/19/2005	10/4/2004	4/19/2005	10/4/2004	4/19/2005	4/19/2005	10/4/2004	4/19/2005
VOLATILE ORGANIC COMPOUNDS (ug/L)													
1,1,1-Trichloroethane	0.3 U	0.6 U	0.3 U	0.6 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	4.1	0.3 U	0.4
1,1-Dichloroethane	0.4 U	0.7 U	0.4 U	0.7 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Chloroethane	0.4 U	0.7 U	0.4 U	0.7 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Chloroform	0.3 U	0.7 U	0.3 U	0.7 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Benzene	0.3 U	0.6 U	0.3 U	0.6 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Toluene	0.4	0.5 U	0.3 U	0.5 U	0.3 U	0.3 U	0.5	0.3 U	0.3 U	0.3 U	0.3 U	0.9	0.3 U
Total Xylenes	0.2 U	0.4 U	0.2 U	0.4 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Tetrachloroethene	0.4	0.7 U	0.5	0.7 U	0.4 U	0.4	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	1	1.6
Trichloroethylene	1	0.8	1.4	1.6	1.2	1.3	0.4 U	0.7	0.4 U	0.7	0.4 U	0.4 U	0.4 U
Trans-1,2-Dichloroethene	0.3 U	1.3	0.4	2.2	0.4	0.8	0.3 U	0.8	0.3 U	0.8	0.3 U	0.3 U	0.3 U
1,1-Dichloroethylene	0.4	0.7 U	0.5	0.7	0.4	0.7	0.3 U	0.6	0.3 U	0.6	1.6	0.3 U	0.3 U
cis-1,2-Dichloroethene	120	170	140	190	130	170	30	140	0.7	140	0.4 U	0.4 U	0.4 U
Vinyl Chloride	63	82	69	87	72	130	150	160	160	160	0.4 U	0.4 U	0.4 U
1,2-Dichloroethane	0.4 U	0.7 U	0.4 U	0.7 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Carbon tetrachloride	0.3 U	0.6 U	0.3 U	0.6 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	0.4 U	0.8 U	0.4 U	0.8 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Methylene Chloride	0.9 U	1.8 U	0.9 U	1.8 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U

Notes:

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Table 2a
MNA Evaluation
2005 VOC Analytical Data
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

Field ID	RW11B		RW14A	RW14A	RW14B	RW15A		RW15B		RW15C		RW16A	
Depth	170	170	118	165	165	113	113	135	135	156	156	121	121
Sample Date	10/4/2004	4/19/2005	10/4/2004	4/18/2005	10/4/2004	10/4/2004	4/19/2005	10/4/2004	4/19/2005	10/4/2004	4/19/2005	10/4/2004	4/19/2005
VOLATILE ORGANIC COMPOUNDS (ug/L)													
1,1,1-Trichloroethane	0.3 U	0.3 U	1	1	4.2	0.8	0.8	0.9	0.7	0.8	0.7	68	160
1,1-Dichloroethane	0.4 U	0.5	3.5	3.8	8.5	0.4 U	0.4 U	0.4	0.4 U	0.5	0.4 U	220	340
Chloroethane	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	1100	790
Chloroform	0.3 U	0.3 U	0.3 U	0.3 U	0.3	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	3.4 U	3.4 U
Benzene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	<u>3.1 U</u>	<u>3.1 U</u>
Toluene	1.2	0.3 U	0.5	0.3	0.8	0.3 U	0.3 U	0.9	0.3 U	0.8	0.3 U	2.7 U	2.7 U
Total Xylenes	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	1.8 U	1.8 U
Tetrachloroethene	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	4.5	2.9	2.8	1.5	2.5	1.8	<u>3.6 U</u>	<u>3.6 U</u>
Trichloroethylene	0.4 U	0.4 U	0.7	0.8	1.7	1.7	0.9	2.4	0.8	2.4	0.8	<u>4 U</u>	9.6
Trans-1,2-Dichloroethene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	3.3 U	3.3 U
1,1-Dichloroethylene	0.6	0.9	0.8	0.7	1.8	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	9.8	24
cis-1,2-Dichloroethene	0.4 U	0.4 U	1	1.4	2.4	3.5	1.1	4.8	1	5	1	3.5 U	16
Vinyl Chloride	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	15	24
1,2-Dichloroethane	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	15	7.3
Carbon tetrachloride	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	<u>3 U</u>	<u>3 U</u>
Chloromethane	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	3.8 U	3.8 U
Methylene Chloride	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	9.1 U	9.1 U

Notes:

All results are reported in micrograms per liter (ug/L).

Depths are reported in feet (ft) below top of well casing.

Sample IDs ending in "P" indicate that it is a duplicate sample.

CAS_RN = Chemical Abstracts Service Registry Number

NJDEP GWQS = New Jersey Department of Environmental Protection Groundwater

Quality Standards

TICs = Tentatively Identified Compounds

U - Indicates that the analyte was not detected at the Method Detection Limit (MDL).

ND = Not Detected

Bold indicates that the concentration exceeds the NJDEP GWQS.

Underline indicates the MDL is greater than GWQS.

Table 2a
MNA Evaluation
2005 VOC Analytical Data
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

Field ID	RW16B		RW16BP
Depth	141.5	141.5	141.5
Sample Date	10/4/2004	4/19/2005	4/19/2005
VOLATILE ORGANIC COMPOUNDS (ug/L)			
1,1,1-Trichloroethane	78	87	130
1,1-Dichloroethane	250	250	340
Chloroethane	1000	450	740
Chloroform	3.4 U	1.7 U	3.4 U
Benzene	<u>3.1 U</u>	<u>1.6 U</u>	<u>3.1 U</u>
Toluene	3	1.4 U	2.7 U
Total Xylenes	1.8 U	0.9 U	1.8 U
Tetrachloroethene	<u>3.6 U</u>	<u>1.8 U</u>	<u>3.6 U</u>
Trichloroethylene	<u>4 U</u>	6.5	8
Trans-1,2-Dichloroethene	3.3 U	1.6 U	3.3 U
1,1-Dichloroethylene	7.2	14	23
cis-1,2-Dichloroethene	3.5 U	11	15
Vinyl Chloride	14	12	22
1,2-Dichloroethane	14	5.9	7.1
Carbon tetrachloride	<u>3 U</u>	1.5 U	<u>3 U</u>
Chloromethane	3.8 U	1.9 U	3.8 U
Methylene Chloride	9.1 U	12	9.1 U

Notes:

All results are reported in micrograms per liter (ug/L).

Depths are reported in feet (ft) below top of well casing.

Sample IDs ending in "P" indicate that it is a duplicate sample.

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Table 2B
MNA Evaluation
2005 Geochemical and Field Parameter Data
Former Ingersoll Rand Facility - Philipsburg, New Jersey

	MW03		MW04		MW06		MW12	
Lab ID	677027		677028		678010		678012	
Sample Date	10/12/2005		10/12/2005		10/17/2005		10/17/2005	
Start Depth	115		108		115		127	
GEOCHEMICAL DATA								
Alkalinity (mg/l)	398		769		236	U	333	
Alkalinity - Bicarbonate (mg/l)	398		769		236		333	
Alkalinity - Carbonate (mg/l)	5	U	5	U	5	U	5	U
Chloride (mg/l)	45.8		25.6		5	U	50.6	
Ferric Iron (mg/l)	0.1	U	0.1	U	0.1	U	1.4	
Ferrous Iron (mg/l)	0.1	U	0.1	U	0.1	U	0.21	
Methane (µg/L)	5	U	14		5	U	44	
Nitrate (mg/l)	2.6		0.11		0.97	U	0.58	
Ethane (µg/L)	5	U	5	U	5	U	5	U
Ethene (µg/L)	5	U	5	U	5	U	5	U
Heterotrophic Plate Count (CFU/mL)	1245		237		145		62	U
Sulfate (mg/l)	93.5		70.8		178		22.1	
Sulfide (mg/l)	1	U	1	U	1	U	1	U
Ammonia (mg/l)	0.1	U	0.7		0.1	U	0.1	U
FIELD PARAMETERS								
pH	6.97		6.78		6.97		7.19	
Temperature (degC)	14.27		15.04		14.27		14.55	
Dissolved Oxygen (mg/L)	6.41		4.98		6.41		5.63	
Specific Conductivity(mS/cm)	1.04		1.5		1.04		0.876	
Dissolved Oxygen (mg/L)	6.41		4.98		6.41		5.63	
Oxidation Reduction Potential (mV)	41		29		41		-97	

Notes:

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ND = Not Detected

Depths are presented in feet from top of casing.

Table 2B
MNA Evaluation
2005 Geochemical and Field Parameter Data
Former Ingersoll Rand Facility - Philipsburg, New Jersey

	MW16		MW18		MW20		MW30	
Lab ID	678011		677819		677820		678009	
Sample Date	10/17/2005		10/14/2005		10/14/2005		10/17/2005	
Start Depth	155		90		134		75	
GEOCHEMICAL DATA								
Alkalinity (mg/l)	269		294		357		197	
Alkalinity - Bicarbonate (mg/l)	269		294		357		197	
Alkalinity - Carbonate (mg/l)	5	U	5	U	5	U	5	U
Chloride (mg/l)	54.6		8.9		13.1		20	
Ferric Iron (mg/l)	0.34		0.25		0.36		1	
Ferrous Iron (mg/l)	0.1	U	0.1		0.39		0.1	U
Methane (µg/L)	5	U	9.2		420		5	U
Nitrate (mg/l)	0.61		3.2		0.8	U	0.14	U
Ethane (µg/L)	5	U	5	U	25	U	5	U
Ethene (µg/L)	5	U	5	U	25	U	5	U
Heterotrophic Plate Count (CFU/mL)	540	U	380		34	U	354	
Sulfate (mg/l)	48.4		19.1		10.2		35.9	
Sulfide (mg/l)	1	U	1	U	1	U	0.1	U
Ammonia (mg/l)	0.1		0.1		0.1	U	0.1	U
FIELD PARAMETERS								
pH	7.48		7.15		7.13		7.3	
Temperature (degC)	16.11		14.04		12.72		13.95	
Dissolved Oxygen (mg/L)	5.37		5.03		5.05		6.84	
Specific Conductivity(mS/cm)	0.852		0.636		0.736		0.559	
Dissolved Oxygen (mg/L)	5.37		5.03		5.05		6.84	
Oxidation Reduction Potential (mV)	61		26		-175		102	

Notes:

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Depths are presented in feet from top of casing.

Table 2B
MNA Evaluation
2005 Geochemical and Field Parameter Data
Former Ingersoll Rand Facility - Philipsburg, New Jersey

	MW33A		MW34		MW35		MW37	
Lab ID	677518		677516		677030		677029	
Sample Date	10/13/2005		10/13/2005		10/12/2005		10/12/2005	
Start Depth	107		113		122		86	
GEOCHEMICAL DATA								
Alkalinity (mg/l)	313		327		370		348	
Alkalinity - Bicarbonate (mg/l)	313		327		370		348	
Alkalinity - Carbonate (mg/l)	5	U	5	U	5	U	5	U
Chloride (mg/l)	41.9		13.8		18.6		12.1	
Ferric Iron (mg/l)	0.17		0.18		0.1	U	0.1	U
Ferrous Iron (mg/l)	0.1	U	0.1	U	0.1	U	0.1	U
Methane (µg/L)	5	U	5	U	5	U	5	U
Nitrate (mg/l)	3		5		2.1		11.5	
Ethane (µg/L)	5	U	5	U	5	U	5	U
Ethene (µg/L)	5	U	5	U	5	U	5	U
Heterotrophic Plate Count (CFU/mL)	152		371		1590		18870	
Sulfate (mg/l)	105		89.3		78.1		36.5	
Sulfide (mg/l)	1	U	1	U	1	U	1	U
Ammonia (mg/l)	0.1	U	0.1	U	0.1	U	0.1	U
FIELD PARAMETERS								
pH	7.24		7.18		7.04		7.22	
Temperature (degC)	16.61		16.89		14.18		13.6	
Dissolved Oxygen (mg/L)	7.55		7.66		9.35		9.23	
Specific Conductivity(mS/cm)	0.973		0.822		0.868		0.807	
Dissolved Oxygen (mg/L)	7.55		7.66		9.35		9.23	
Oxidation Reduction Potential (mV)	53		62		80		51	

Notes:

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Depths are presented in feet from top of casing.

Table 2B
MNA Evaluation
2005 Geochemical and Field Parameter Data
Former Ingersoll Rand Facility - Philipsburg, New Jersey

	MW42		MW47		MW49		MW51A	
Lab ID	677515		677818		678433		677517	
Sample Date	10/13/2005		10/14/2005		10/18/2005		10/13/2005	
Start Depth	118		136.5		54		135	
GEOCHEMICAL DATA								
Alkalinity (mg/l)	257		256		208		246	
Alkalinity - Bicarbonate (mg/l)	257		256		208	U	246	
Alkalinity - Carbonate (mg/l)	5	U	5	U	5U		5	U
Chloride (mg/l)	50.9		27.3		32.5		52.4	
Ferric Iron (mg/l)	0.1	U	0.46		0.39		1.8	
Ferrous Iron (mg/l)	0.1	U	0.1	U	0.1	U	0.1	U
Methane (µg/L)	5	U	5	U	5	U	5	U
Nitrate (mg/l)	5		5.6		7.6		3.7	
Ethane (µg/L)	5	U	5	U	5	U	5	U
Ethene (µg/L)	5	U	5	U	5	U	5	U
Heterotrophic Plate Count (CFU/mL)	920		486		505		1220	
Sulfate (mg/l)	21.9		35		26.2		31.8	
Sulfide (mg/l)	1	U	1	U	1	U	1	U
Ammonia (mg/l)	0.1	U	0.1	U	0.13		0.11	
FIELD PARAMETERS								
pH	7.23		7.1		7.23		7.43	
Temperature (degC)	14		13.26		11.52		15.11	
Dissolved Oxygen (mg/L)	9.09		9.39		8.91		7.14	
Specific Conductivity(mS/cm)	0.738		0.707		0.649		0.742	
Dissolved Oxygen (mg/L)	9.09		9.39		8.91		7.14	
Oxidation Reduction Potential (mV)	106		121		146		25	

Notes:

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ND = Not Detected

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Table 2B
MNA Evaluation
2005 Geochemical and Field Parameter Data
Former Ingersoll Rand Facility - Philipsburg, New Jersey

	MW53	RW09	RW16
Lab ID	677821	678434	678435
Sample Date	10/14/2005	10/18/2005	10/18/2005
Start Depth	127	119	121
GEOCHEMICAL DATA			
Alkalinity (mg/l)	768	312 U	480
Alkalinity - Bicarbonate (mg/l)	768	312	480
Alkalinity - Carbonate (mg/l)	5 U	5 U	5 U
Chloride (mg/l)	50.9	139	82.9
Ferric Iron (mg/l)	1.9	1.3	1.7
Ferrous Iron (mg/l)	0.28	3.3	4.6
Methane (µg/L)	13	3600	3000
Nitrate (mg/l)	0.1 U	0.1 U	0.1 U
Ethane (µg/L)	5 U	250 U	120 U
Ethene (µg/L)	5 U	250 U	120 U
Heterotrophic Plate Count (CFU/mL)	51700	416 U	529
Sulfate (mg/l)	45.4	5 U	5 U
Sulfide (mg/l)	1 U	1 U	1 U
Ammonia (mg/l)	1.8	0.28	0.86 U
FIELD PARAMETERS			
pH	6.68	7.17	6.93
Temperature (degC)	17.79	17.64	16.33
Dissolved Oxygen (mg/L)	4	2.94	3.21
Specific Conductivity(mS/cm)	1.69	1.11	1.22
Dissolved Oxygen (mg/L)	4	2.94	3.21
Oxidation Reduction Potential (mV)	-68	-187	-197

Notes:

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Depths are presented in feet from top of casing.

Table 3A
MNA Evaluation
Analytical Results
Volatile Organic Compounds
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

		Sample ID Lab ID Sample Date Start Depth Sample Time GWQC	MW02A J29228-1 5/1/2006 125 8:15	MW03A J29228-2 5/1/2006 115 8:30	MW04A J29228-3 5/1/2006 96 8:45	MW04B J29228-4 5/1/2006 108 8:48
Analyte	CAS-RN					
1,1,1-Trichloroethane	71-55-6	30	3.2	1.1	0.64 J	0.65 J
1,1-Dichloroethane	75-34-3	50	0.78 J	2.3	1.1	1.4
Chloroethane	75-00-3	100	0.33 U	0.33 U	0.33 U	0.33 U
Chloroform	67-66-3	6	0.19 U	0.19 U	0.19 U	0.19 U
Benzene	71-43-2	1	0.18 U	0.18 U	0.18 U	0.18 U
Ethylbenzene	100-41-4	700	0.23 U	0.23 U	0.23 U	0.23 U
Toluene	108-88-3	1000	0.31 U	0.31 U	0.31 U	0.31 U
Total Xylenes	1330-20-7	1000	0.25 U	0.25 U	0.25 U	0.25 U
Tetrachloroethene	127-18-4	1	0.28 U	0.28 U	6.7	10.6
Trichloroethylene	79-01-6	1	0.24 J	0.48 J	13.9	17.3
Trans-1,2-Dichloroethene	156-60-5	100	0.38 U	0.38 U	0.86 J	0.83 J
1,1-Dichloroethylene	75-35-4	2	0.98 J	0.58 U	0.72 J	0.78 J
cis-1,2-Dichloroethene	156-59-2	70	0.56 U	0.64 J	42.7	52.9
Vinyl Chloride	75-01-4	5	0.35 U	0.35 U	18.9	25.2
1,2-Dichloroethane	107-06-2	2	0.48 U	0.48 U	0.48 U	0.48 U
Carbon tetrachloride	56-23-5	2	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	74-87-3	30	0.42 U	0.42 U	0.42 U	0.42 U
Methylene Chloride	75-09-2	3	0.19 U	0.19 U	0.19 U	0.19 U

Notes:

All results are reported in micrograms per liter (µg/L).

Depths are presented in feet from top of casing.

GWQC - represents the most stringent of the NJDEP Ground Water Quality Criteria (GWQC).

BOLD values indicate that the result exceeds the GWQC.

UNDERLINED values indicate the Method Detection Limit (MDL) exceeds the GWQC.

CAS-RN = Chemical Abstract Service Registry Number.

J - Indicates that the analyte was detected at a concentration less than the MDL and is estimated.

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P - Indicates a duplicate sample.

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Table 3A
MNA Evaluation
Analytical Results
Volatile Organic Compounds
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

		Sample ID	MW04C	MW06A	MW06B	MW11A
		Lab ID	J29228-5	J29228-10	J29228-11	J29360-4
		Sample Date	5/1/2006	5/1/2006	5/1/2006	5/2/2006
		Start Depth	120	172	187	100
		Sample Time	8:52	9:40	9:50	8:00
Analyte	CAS-RN	GWQC				
1,1,1-Trichloroethane	71-55-6	30	0.63 J	1.1	6.3	1.9
1,1-Dichloroethane	75-34-3	50	1.4	2.2	1.1	0.7 U
Chloroethane	75-00-3	100	0.33 U	0.33 U	0.33 U	0.33 U
Chloroform	67-66-3	6	0.19 U	0.19 U	0.19 U	0.19 U
Benzene	71-43-2	1	0.18 U	0.18 U	0.18 U	0.18 U
Ethylbenzene	100-41-4	700	0.23 U	0.23 U	0.23 U	0.23 U
Toluene	108-88-3	1000	0.31 U	0.31 U	0.31 U	0.31 U
Total Xylenes	1330-20-7	1000	0.25 U	0.25 U	0.25 U	0.25 U
Tetrachloroethene	127-18-4	1	9.4	0.28 U	0.28 U	0.5 J
Trichloroethylene	79-01-6	1	16.8	0.24 J	1.3	0.2 U
Trans-1,2-Dichloroethene	156-60-5	100	0.8 J	0.38 U	0.38 U	0.38 U
1,1-Dichloroethylene	75-35-4	2	0.69 J	0.58 U	1.5	0.58 U
cis-1,2-Dichloroethene	156-59-2	70	51.8	0.56 U	0.56 U	0.56 U
Vinyl Chloride	75-01-4	5	24.9	0.35 U	0.35 U	0.35 U
1,2-Dichloroethane	107-06-2	2	0.48 U	0.48 U	0.48 U	0.48 U
Carbon tetrachloride	56-23-5	2	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	74-87-3	30	0.42 U	0.42 U	0.42 U	0.42 U
Methylene Chloride	75-09-2	3	0.19 U	0.19 U	0.19 U	0.19 U

Notes:

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Depths are presented in feet from top of casing.

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Table 3A
MNA Evaluation
Analytical Results
Volatile Organic Compounds
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

Analyte	CAS-RN	Sample ID	MW11B	MW11C	MW12A	MW12B
		Lab ID	J29360-5	J29360-6	J29360-26	J29360-27
		Sample Date	5/2/2006	5/2/2006	5/2/2006	5/2/2006
		Start Depth	150	190	163	183
		Sample Time	8:05	8:10	12:10	12:15
		GWQC				
1,1,1-Trichloroethane	71-55-6	30	1.8	1.7	0.24 U	0.24 U
1,1-Dichloroethane	75-34-3	50	0.7 U	0.7 U	0.7 U	0.7 U
Chloroethane	75-00-3	100	0.33 U	0.33 U	0.33 U	0.33 U
Chloroform	67-66-3	6	0.19 U	0.19 U	0.19 U	0.19 U
Benzene	71-43-2	1	0.18 U	0.18 U	0.18 U	0.18 U
Ethylbenzene	100-41-4	700	0.23 U	0.23 U	0.23 U	0.23 U
Toluene	108-88-3	1000	0.31 U	0.31 U	0.31 U	0.31 U
Total Xylenes	1330-20-7	1000	0.25 U	0.25 U	0.25 U	0.25 U
Tetrachloroethene	127-18-4	1	0.28 U	0.28 U	0.44 J	0.28 U
Trichloroethylene	79-01-6	1	0.2 U	0.2 U	0.2 U	0.2 U
Trans-1,2-Dichloroethene	156-60-5	100	0.38 U	0.38 U	0.38 U	0.38 U
1,1-Dichloroethylene	75-35-4	2	0.58 U	0.58 U	0.58 U	0.58 U
cis-1,2-Dichloroethene	156-59-2	70	0.56 U	0.56 U	0.56 U	0.56 U
Vinyl Chloride	75-01-4	5	0.35 U	0.35 U	0.35 U	0.35 U
1,2-Dichloroethane	107-06-2	2	0.48 U	0.48 U	0.48 U	0.48 U
Carbon tetrachloride	56-23-5	2	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	74-87-3	30	0.42 U	0.42 U	0.42 U	0.42 U
Methylene Chloride	75-09-2	3	0.19 U	0.19 U	0.19 U	0.19 U

Notes:

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Table 3A
MNA Evaluation
Analytical Results
Volatile Organic Compounds
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

Analyte	CAS-RN	Sample ID	MW13A	MW13B	MW15A	MW15B
		Lab ID	J29360-2	J29360-3	J29360-11	J29360-12
		Sample Date	5/2/2006	5/2/2006	5/2/2006	5/2/2006
		Start Depth	157	189	130	136
		Sample Time	7:45	7:50	8:45	8:50
GWQC						
1,1,1-Trichloroethane	71-55-6	30	0.24 U	0.24 U	1.3	0.84 J
1,1-Dichloroethane	75-34-3	50	0.7 U	0.7 U	4.7	5.1
Chloroethane	75-00-3	100	0.33 U	0.33 U	0.33 U	0.33 U
Chloroform	67-66-3	6	0.19 U	0.19 U	0.19 U	0.19 U
Benzene	71-43-2	1	0.18 U	0.18 U	0.18 U	0.18 U
Ethylbenzene	100-41-4	700	0.23 U	0.23 U	0.23 U	0.23 U
Toluene	108-88-3	1000	0.31 U	0.31 U	0.31 U	0.31 U
Total Xylenes	1330-20-7	1000	0.25 U	0.25 U	0.25 U	0.25 U
Tetrachloroethene	127-18-4	1	0.28 U	0.28 U	0.28 U	0.28 U
Trichloroethylene	79-01-6	1	0.2 U	0.2 U	0.2 U	0.2 U
Trans-1,2-Dichloroethene	156-60-5	100	0.38 U	0.38 U	0.38 U	0.38 U
1,1-Dichloroethylene	75-35-4	2	0.58 U	0.58 U	0.76 J	0.58 U
cis-1,2-Dichloroethene	156-59-2	70	0.56 U	0.56 U	0.73 J	0.66 J
Vinyl Chloride	75-01-4	5	0.35 U	0.35 U	0.35 U	0.35 U
1,2-Dichloroethane	107-06-2	2	0.48 U	0.48 U	0.48 U	0.48 U
Carbon tetrachloride	56-23-5	2	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	74-87-3	30	0.42 U	0.42 U	0.42 U	0.42 U
Methylene Chloride	75-09-2	3	0.19 U	0.19 U	0.19 U	0.19 U

Notes:

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CAS-RN = Chemical Abstract Service Registry Number.

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Table 3A
MNA Evaluation
Analytical Results
Volatile Organic Compounds
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

		Sample ID	MW16A	MW16B	MW16BP	MW16C
		Lab ID	J29360-7	J29360-8	J29360-9	J29360-10
		Sample Date	5/2/2006	5/2/2006	5/2/2006	5/2/2006
		Start Depth	130	155	155	190
		Sample Time	8:20	8:25	8:30	8:35
Analyte	CAS-RN	GWQC				
1,1,1-Trichloroethane	71-55-6	30	12.6	8.3	8.6	7.5
1,1-Dichloroethane	75-34-3	50	5.2	3.6	3.7	4.3
Chloroethane	75-00-3	100	0.33 U	0.33 U	0.33 U	0.33 U
Chloroform	67-66-3	6	0.19 U	0.19 U	0.19 U	0.19 U
Benzene	71-43-2	1	0.18 U	0.18 U	0.18 U	0.18 U
Ethylbenzene	100-41-4	700	0.23 U	0.23 U	0.23 U	0.23 U
Toluene	108-88-3	1000	0.31 U	0.31 U	0.31 U	0.31 U
Total Xylenes	1330-20-7	1000	0.25 U	0.25 U	0.25 U	0.25 U
Tetrachloroethene	127-18-4	1	0.39 J	0.43 J	0.39 J	0.66 J
Trichloroethylene	79-01-6	1	0.2 U	0.2 U	0.2 U	0.34 J
Trans-1,2-Dichloroethene	156-60-5	100	0.38 U	0.38 U	0.38 U	0.38 U
1,1-Dichloroethylene	75-35-4	2	4.9	3.6	4	3.9
cis-1,2-Dichloroethene	156-59-2	70	0.56 U	0.56 U	0.56 U	0.56 U
Vinyl Chloride	75-01-4	5	0.35 U	0.35 U	0.35 U	0.35 U
1,2-Dichloroethane	107-06-2	2	0.48 U	0.48 U	0.48 U	0.48 U
Carbon tetrachloride	56-23-5	2	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	74-87-3	30	0.42 U	0.42 U	0.42 U	0.42 U
Methylene Chloride	75-09-2	3	0.19 U	0.19 U	0.19 U	0.19 U

Notes:

All results are reported in micrograms per liter (µg/L).

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Table 3A
MNA Evaluation
Analytical Results
Volatile Organic Compounds
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

Analyte	CAS-RN	Sample ID	MW18A	MW19A	MW19B	MW20A
		Lab ID	J29228-34	J29228-36	J29228-37	J29228-35
		Sample Date	5/1/2006	5/1/2006	5/1/2006	5/1/2006
		Start Depth	112	135	147	134
		Sample Time	13:45	14:05	14:10	13:55
GWQC						
1,1,1-Trichloroethane	71-55-6	30	0.24 U	0.24 U	0.24 U	0.24 U
1,1-Dichloroethane	75-34-3	50	0.7 U	0.7 U	0.7 U	0.7 U
Chloroethane	75-00-3	100	0.33 U	0.33 U	0.33 U	0.33 U
Chloroform	67-66-3	6	0.19 U	0.19 U	0.35 J	0.19 U
Benzene	71-43-2	1	0.18 U	0.18 U	0.18 U	0.18 U
Ethylbenzene	100-41-4	700	0.23 U	0.23 U	0.23 U	0.23 U
Toluene	108-88-3	1000	0.31 U	0.31 U	0.31 U	0.31 U
Total Xylenes	1330-20-7	1000	0.25 U	0.25 U	0.25 U	0.25 U
Tetrachloroethene	127-18-4	1	0.28 U	0.28 U	0.28 U	0.28 U
Trichloroethylene	79-01-6	1	0.2 U	0.2 U	0.2 U	0.2 U
Trans-1,2-Dichloroethene	156-60-5	100	0.38 U	0.38 U	0.38 U	0.38 U
1,1-Dichloroethylene	75-35-4	2	0.58 U	0.58 U	0.58 U	0.58 U
cis-1,2-Dichloroethene	156-59-2	70	0.56 U	0.56 U	0.56 U	0.56 U
Vinyl Chloride	75-01-4	5	0.35 U	0.35 U	0.35 U	0.35 U
1,2-Dichloroethane	107-06-2	2	0.48 U	0.48 U	0.48 U	0.48 U
Carbon tetrachloride	56-23-5	2	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	74-87-3	30	0.42 U	0.42 U	0.42 U	0.42 U
Methylene Chloride	75-09-2	3	0.19 U	0.19 U	0.19 U	0.19 U

Notes:

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Table 3A
MNA Evaluation
Analytical Results
Volatile Organic Compounds
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

Analyte	CAS-RN	Sample ID	MW24A	MW24B	MW24C	MW26A
		Lab ID	J29228-25	J29228-26	J29228-27	J29228-39
		Sample Date	5/1/2006	5/1/2006	5/1/2006	5/1/2006
		Start Depth	134	145	151	145
		Sample Time	12:15	12:18	12:22	14:30
		GWQC				
1,1,1-Trichloroethane	71-55-6	30	0.24 U	0.24 U	0.24 U	0.24 U
1,1-Dichloroethane	75-34-3	50	0.7 U	0.7 U	0.7 U	0.7 U
Chloroethane	75-00-3	100	0.33 U	0.33 U	0.33 U	0.33 U
Chloroform	67-66-3	6	0.19 U	0.19 U	0.19 U	0.19 U
Benzene	71-43-2	1	0.18 U	0.18 U	0.18 U	0.18 U
Ethylbenzene	100-41-4	700	0.23 U	0.23 U	0.23 U	0.23 U
Toluene	108-88-3	1000	0.31 U	0.31 U	0.31 U	0.31 U
Total Xylenes	1330-20-7	1000	0.25 U	0.25 U	0.25 U	0.25 U
Tetrachloroethene	127-18-4	1	0.28 U	0.28 U	0.28 U	0.28 U
Trichloroethylene	79-01-6	1	0.2 U	0.2 U	0.2 U	0.2 U
Trans-1,2-Dichloroethene	156-60-5	100	0.38 U	0.38 U	0.38 U	0.38 U
1,1-Dichloroethylene	75-35-4	2	0.58 U	0.58 U	0.58 U	0.58 U
cis-1,2-Dichloroethene	156-59-2	70	0.56 U	0.56 U	0.56 U	0.56 U
Vinyl Chloride	75-01-4	5	0.35 U	0.35 U	0.35 U	0.35 U
1,2-Dichloroethane	107-06-2	2	0.48 U	0.48 U	0.48 U	0.48 U
Carbon tetrachloride	56-23-5	2	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	74-87-3	30	0.42 U	0.42 U	0.42 U	0.42 U
Methylene Chloride	75-09-2	3	0.19 U	0.19 U	0.19 U	0.19 U

Notes:

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Table 3A
MNA Evaluation
Analytical Results
Volatile Organic Compounds
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

		Sample ID Lab ID Sample Date Start Depth Sample Time GWQC	MW26B J29228-40 5/1/2006 133 14:35	MW27A J29360-1 5/2/2006 137 7:35	MW30A J29228-41 5/1/2006 75 14:45	MW32A J29360-13 5/2/2006 118 9:00
Analyte	CAS-RN					
1,1,1-Trichloroethane	71-55-6	30	0.24 U	0.24 U	0.24 U	4.3
1,1-Dichloroethane	75-34-3	50	0.7 U	0.7 U	0.7 U	7.3
Chloroethane	75-00-3	100	0.33 U	0.33 U	0.33 U	0.33 U
Chloroform	67-66-3	6	0.19 U	0.19 U	0.19 U	0.45 J
Benzene	71-43-2	1	0.18 U	0.18 U	0.18 U	0.18 U
Ethylbenzene	100-41-4	700	0.23 U	0.23 U	0.23 U	0.23 U
Toluene	108-88-3	1000	0.31 U	0.31 U	0.31 U	0.31 U
Total Xylenes	1330-20-7	1000	0.25 U	0.25 U	0.25 U	0.25 U
Tetrachloroethene	127-18-4	1	0.28 U	0.28 U	0.28 U	0.51 J
Trichloroethylene	79-01-6	1	0.2 U	0.2 U	0.2 U	1.2
Trans-1,2-Dichloroethene	156-60-5	100	0.38 U	0.38 U	0.38 U	0.38 U
1,1-Dichloroethylene	75-35-4	2	0.58 U	0.58 U	0.58 U	2.1
cis-1,2-Dichloroethene	156-59-2	70	0.56 U	0.56 U	0.56 U	1.3
Vinyl Chloride	75-01-4	5	0.35 U	0.35 U	0.35 U	0.35 U
1,2-Dichloroethane	107-06-2	2	0.48 U	0.48 U	0.48 U	0.48 U
Carbon tetrachloride	56-23-5	2	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	74-87-3	30	0.42 U	0.42 U	0.42 U	0.42 U
Methylene Chloride	75-09-2	3	0.19 U	0.19 U	0.19 U	0.19 U

Notes:

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Table 3A
MNA Evaluation
Analytical Results
Volatile Organic Compounds
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

Analyte	CAS-RN	Sample ID	MW32B	MW33AA	MW33AB	MW34A
		Lab ID	J29360-14	J29228-19	J29228-20	J29228-15
		Sample Date	5/2/2006	5/1/2006	5/1/2006	5/1/2006
		Start Depth	129	107	120	108
		Sample Time	9:05	11:20	11:25	10:35
		GWQC				
1,1,1-Trichloroethane	71-55-6	30	4.7	1.6	1.4	1.9
1,1-Dichloroethane	75-34-3	50	7.8	0.7 U	0.7 U	0.7 U
Chloroethane	75-00-3	100	0.33 U	0.33 U	0.33 U	0.33 U
Chloroform	67-66-3	6	0.49 J	0.19 U	0.19 U	0.19 U
Benzene	71-43-2	1	0.18 U	0.18 U	0.18 U	0.18 U
Ethylbenzene	100-41-4	700	0.23 U	0.23 U	0.23 U	0.23 U
Toluene	108-88-3	1000	0.31 U	0.31 U	0.31 U	0.31 U
Total Xylenes	1330-20-7	1000	0.25 U	0.25 U	0.25 U	0.25 U
Tetrachloroethene	127-18-4	1	0.61 J	1	0.94 J	0.9 J
Trichloroethylene	79-01-6	1	1.4	2.5	2	2.7
Trans-1,2-Dichloroethene	156-60-5	100	0.38 U	0.38 U	0.38 U	0.38 U
1,1-Dichloroethylene	75-35-4	2	1.6	1.1	0.96 J	0.63 J
cis-1,2-Dichloroethene	156-59-2	70	1.3	0.56 U	0.56 U	0.56 U
Vinyl Chloride	75-01-4	5	0.35 U	0.35 U	0.35 U	0.35 U
1,2-Dichloroethane	107-06-2	2	0.48 U	0.48 U	0.48 U	0.48 U
Carbon tetrachloride	56-23-5	2	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	74-87-3	30	0.42 U	0.42 U	0.42 U	0.42 U
Methylene Chloride	75-09-2	3	0.19 U	0.19 U	0.19 U	0.19 U

Notes:

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Table 3A
MNA Evaluation
Analytical Results
Volatile Organic Compounds
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

Analyte	CAS-RN	Sample ID	MW34B	MW34C	MW35A	MW35B
		Lab ID	J29228-16	J29228-17	J29228-12	J29228-13
		Sample Date	5/1/2006	5/1/2006	5/1/2006	5/1/2006
		Start Depth	113	120	122	128
		Sample Time	10:40	10:45	10:00	10:05
		GWQC				
1,1,1-Trichloroethane	71-55-6	30	1.7	1.6	88.9	82.4
1,1-Dichloroethane	75-34-3	50	0.7 U	0.7 U	17.1	15.5
Chloroethane	75-00-3	100	0.33 U	0.33 U	0.33 U	0.33 U
Chloroform	67-66-3	6	0.19 U	0.19 U	0.19 U	0.19 U
Benzene	71-43-2	1	0.18 U	0.18 U	0.18 U	0.18 U
Ethylbenzene	100-41-4	700	0.23 U	0.23 U	0.23 U	0.23 U
Toluene	108-88-3	1000	0.31 U	0.31 U	0.31 U	0.31 U
Total Xylenes	1330-20-7	1000	0.25 U	0.25 U	0.25 U	0.25 U
Tetrachloroethene	127-18-4	1	1.1	1.7	2.5	2.4
Trichloroethylene	79-01-6	1	2.8	2.6	6.3	5.8
Trans-1,2-Dichloroethene	156-60-5	100	0.38 U	0.38 U	0.38 U	0.38 U
1,1-Dichloroethylene	75-35-4	2	0.65 J	0.64 J	4.2	4.2
cis-1,2-Dichloroethene	156-59-2	70	0.8 J	0.75 J	0.56 U	0.56 U
Vinyl Chloride	75-01-4	5	0.35 U	0.35 U	0.35 U	0.35 U
1,2-Dichloroethane	107-06-2	2	0.48 U	0.48 U	0.48 U	0.48 U
Carbon tetrachloride	56-23-5	2	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	74-87-3	30	0.42 U	0.42 U	0.42 U	0.42 U
Methylene Chloride	75-09-2	3	0.19 U	0.19 U	0.19 U	0.19 U

Notes:

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Table 3A
MNA Evaluation
Analytical Results
Volatile Organic Compounds
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

		Sample ID	MW37A	MW37B	MW37C	MW37CP
		Lab ID	J29228-6	J29228-7	J29228-8	J29228-9
Analyte	CAS-RN	Sample Date	5/1/2006	5/1/2006	5/1/2006	5/1/2006
		Start Depth	60	86	98	98
		Sample Time	9:00	9:05	9:10	9:15
		GWQC				
1,1,1-Trichloroethane	71-55-6	30	0.24 U	0.24 U	0.24 U	0.24 U
1,1-Dichloroethane	75-34-3	50	0.7 U	0.7 U	0.7 U	0.7 U
Chloroethane	75-00-3	100	0.33 U	0.33 U	0.33 U	0.33 U
Chloroform	67-66-3	6	0.19 U	0.19 U	0.19 U	0.19 U
Benzene	71-43-2	1	0.18 U	0.18 U	0.18 U	0.18 U
Ethylbenzene	100-41-4	700	0.23 U	0.23 U	0.23 U	0.23 U
Toluene	108-88-3	1000	0.31 U	0.31 U	0.31 U	0.31 U
Total Xylenes	1330-20-7	1000	0.25 U	0.25 U	0.25 U	0.25 U
Tetrachloroethene	127-18-4	1	0.28 U	0.28 U	0.28 U	0.28 U
Trichloroethylene	79-01-6	1	11.6	4.7	17.4	15.1
Trans-1,2-Dichloroethene	156-60-5	100	0.38 U	0.38 U	0.38 U	0.38 U
1,1-Dichloroethylene	75-35-4	2	0.58 U	0.58 U	0.58 U	0.58 U
cis-1,2-Dichloroethene	156-59-2	70	0.56 U	0.56 U	0.56 U	0.56 U
Vinyl Chloride	75-01-4	5	0.35 U	0.35 U	0.35 U	0.35 U
1,2-Dichloroethane	107-06-2	2	0.48 U	0.48 U	0.48 U	0.48 U
Carbon tetrachloride	56-23-5	2	1.5	0.58 J	2.7	2.3
Chloromethane	74-87-3	30	0.42 U	0.42 U	0.42 U	0.42 U
Methylene Chloride	75-09-2	3	0.19 U	1.3	0.19 U	0.19 U

Notes:

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Table 3A
MNA Evaluation
Analytical Results
Volatile Organic Compounds
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

		Sample ID	MW47A	MW48A	MW49A	MW50A
		Lab ID	J29228-33	J29228-38	J29360-31	J29228-14
		Sample Date	5/1/2006	5/1/2006	5/2/2006	5/1/2006
		Start Depth	136.5	132	54	150
		Sample Time	13:35	14:20	13:15	10:15
Analyte	CAS-RN	GWQC				
1,1,1-Trichloroethane	71-55-6	30	0.24 U	0.24 U	0.24 U	1.2
1,1-Dichloroethane	75-34-3	50	0.7 U	0.7 U	0.7 U	0.7 U
Chloroethane	75-00-3	100	0.33 U	0.33 U	0.33 U	0.33 U
Chloroform	67-66-3	6	0.19 U	0.19 U	0.19 U	0.19 U
Benzene	71-43-2	1	0.18 U	0.18 U	0.18 U	0.18 U
Ethylbenzene	100-41-4	700	0.23 U	0.23 U	0.23 U	0.23 U
Toluene	108-88-3	1000	0.31 U	0.31 U	0.31 U	0.31 U
Total Xylenes	1330-20-7	1000	0.25 U	0.25 U	0.25 U	0.25 U
Tetrachloroethene	127-18-4	1	0.28 U	0.28 U	0.28 U	0.28 U
Trichloroethylene	79-01-6	1	0.2 U	0.2 U	0.2 U	0.34 J
Trans-1,2-Dichloroethene	156-60-5	100	0.38 U	0.38 U	0.38 U	0.38 U
1,1-Dichloroethylene	75-35-4	2	0.58 U	0.58 U	0.58 U	0.58 U
cis-1,2-Dichloroethene	156-59-2	70	0.56 U	0.56 U	0.56 U	0.56 U
Vinyl Chloride	75-01-4	5	0.35 U	0.35 U	0.35 U	0.35 U
1,2-Dichloroethane	107-06-2	2	0.48 U	0.48 U	0.48 U	0.48 U
Carbon tetrachloride	56-23-5	2	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	74-87-3	30	0.42 U	0.42 U	0.42 U	0.42 U
Methylene Chloride	75-09-2	3	0.19 U	0.19 U	0.19 U	0.19 U

Notes:

All results are reported in micrograms per liter (µg/L).

Depths are presented in feet from top of casing.

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BOLD values indicate that the result exceeds the GWQC.

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Table 3A
MNA Evaluation
Analytical Results
Volatile Organic Compounds
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

		Sample ID	MW51AA	MW52A	MW52B	MW53A
		Lab ID	J29228-18	J29228-23	J29228-24	J29228-21
		Sample Date	5/1/2006	5/1/2006	5/1/2006	5/1/2006
		Start Depth	135	109	170	127
		Sample Time	11:05	12:00	12:05	11:40
Analyte	CAS-RN	GWQC				
1,1,1-Trichloroethane	71-55-6	30	0.24 U	0.24 U	0.24 U	0.24 U
1,1-Dichloroethane	75-34-3	50	0.7 U	0.7 U	0.7 U	0.7 U
Chloroethane	75-00-3	100	0.33 U	0.33 U	0.33 U	0.33 U
Chloroform	67-66-3	6	0.19 U	0.19 U	0.19 U	0.19 U
Benzene	71-43-2	1	0.18 U	0.18 U	0.18 U	0.18 U
Ethylbenzene	100-41-4	700	0.23 U	0.23 U	0.23 U	0.23 U
Toluene	108-88-3	1000	0.31 U	0.31 U	0.31 U	0.31 U
Total Xylenes	1330-20-7	1000	0.25 U	0.25 U	0.25 U	0.25 U
Tetrachloroethene	127-18-4	1	0.28 U	0.28 U	0.28 U	0.28 U
Trichloroethylene	79-01-6	1	0.2 U	0.2 U	0.2 U	0.2 U
Trans-1,2-Dichloroethene	156-60-5	100	0.38 U	0.38 U	0.38 U	0.38 U
1,1-Dichloroethylene	75-35-4	2	0.58 U	0.58 U	0.58 U	0.58 U
cis-1,2-Dichloroethene	156-59-2	70	0.56 U	0.56 U	0.56 U	0.56 U
Vinyl Chloride	75-01-4	5	0.35 U	0.35 U	0.35 U	0.35 U
1,2-Dichloroethane	107-06-2	2	0.48 U	0.48 U	0.48 U	0.48 U
Carbon tetrachloride	56-23-5	2	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	74-87-3	30	0.42 U	0.42 U	0.42 U	0.42 U
Methylene Chloride	75-09-2	3	0.19 U	0.19 U	0.19 U	0.19 U

Notes:

All results are reported in micrograms per liter (µg/L).

Depths are presented in feet from top of casing.

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Table 3A
MNA Evaluation
Analytical Results
Volatile Organic Compounds
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

Analyte	CAS-RN	Sample ID	MW53B	MW54A	RW09A	RW09B
		Lab ID	J29228-22	J29228-32	J29360-41	J29360-42
		Sample Date	5/1/2006	5/1/2006	5/2/2006	5/2/2006
		Start Depth	140	120	90	118
		Sample Time	11:45	13:25	14:35	14:40
GWQC						
1,1,1-Trichloroethane	71-55-6	30	0.24 U	0.24 U	0.24 U	0.24 U
1,1-Dichloroethane	75-34-3	50	0.7 U	0.7 U	0.7 U	0.7 U
Chloroethane	75-00-3	100	0.33 U	0.33 U	0.33 U	0.33 U
Chloroform	67-66-3	6	0.19 U	0.19 U	0.19 U	0.19 U
Benzene	71-43-2	1	0.18 U	0.18 U	0.18 U	0.18 U
Ethylbenzene	100-41-4	700	0.23 U	0.23 U	0.23 U	0.23 U
Toluene	108-88-3	1000	0.31 U	0.31 U	0.31 U	0.31 U
Total Xylenes	1330-20-7	1000	0.25 U	0.25 U	0.25 U	0.25 U
Tetrachloroethene	127-18-4	1	0.28 U	0.28 U	1.6	2
Trichloroethylene	79-01-6	1	0.2 U	0.2 U	2.4	2.3
Trans-1,2-Dichloroethene	156-60-5	100	0.38 U	0.38 U	1.9	1.5
1,1-Dichloroethylene	75-35-4	2	0.58 U	0.58 U	1.4	1.3
cis-1,2-Dichloroethene	156-59-2	70	0.56 U	0.56 U	151	165
Vinyl Chloride	75-01-4	5	0.35 U	0.35 U	91.1	50.8
1,2-Dichloroethane	107-06-2	2	0.48 U	0.48 U	0.48 U	0.48 U
Carbon tetrachloride	56-23-5	2	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	74-87-3	30	0.42 U	0.42 U	0.42 U	0.42 U
Methylene Chloride	75-09-2	3	0.19 U	0.19 U	0.19 U	0.19 U

Notes:

All results are reported in micrograms per liter (µg/L).

Depths are presented in feet from top of casing.

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BOLD values indicate that the result exceeds the GWQC.

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Table 3A
MNA Evaluation
Analytical Results
Volatile Organic Compounds
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

		Sample ID	RW09C	RW09D	RW09E	RW10A
		Lab ID	J29360-43	J29360-44	J29360-45	J29228-28
		Sample Date	5/2/2006	5/2/2006	5/2/2006	5/1/2006
		Start Depth	147	160	188	152
		Sample Time	14:45	14:50	14:55	12:30
Analyte	CAS-RN	GWQC				
1,1,1-Trichloroethane	71-55-6	30	0.24 U	0.24 U	0.24 U	1.3
1,1-Dichloroethane	75-34-3	50	0.7 U	0.7 U	0.7 U	0.7 U
Chloroethane	75-00-3	100	0.33 U	0.33 U	0.33 U	0.33 U
Chloroform	67-66-3	6	0.19 U	0.19 U	0.19 U	0.19 U
Benzene	71-43-2	1	0.18 U	0.18 U	0.18 U	0.18 U
Ethylbenzene	100-41-4	700	0.23 U	0.23 U	0.23 U	0.23 U
Toluene	108-88-3	1000	0.31 U	0.31 U	0.31 U	0.31 U
Total Xylenes	1330-20-7	1000	0.25 U	0.25 U	0.25 U	0.25 U
Tetrachloroethene	127-18-4	1	1.4	0.28 U	0.28 U	0.28 U
Trichloroethylene	79-01-6	1	2.4	0.2 U	0.2 U	0.2 U
Trans-1,2-Dichloroethene	156-60-5	100	2.5	1.8	0.38 U	0.38 U
1,1-Dichloroethylene	75-35-4	2	1.5	0.83 J	0.58 U	0.58 U
cis-1,2-Dichloroethene	156-59-2	70	173	141	1.1	0.56 U
Vinyl Chloride	75-01-4	5	71.3	169	14.6	0.35 U
1,2-Dichloroethane	107-06-2	2	0.48 U	0.48 U	0.48 U	0.48 U
Carbon tetrachloride	56-23-5	2	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	74-87-3	30	0.42 U	0.42 U	0.42 U	0.42 U
Methylene Chloride	75-09-2	3	0.19 U	0.19 U	0.19 U	0.19 U

Notes:

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Depths are presented in feet from top of casing.

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Table 3A
MNA Evaluation
Analytical Results
Volatile Organic Compounds
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

		Sample ID Lab ID Sample Date Start Depth Sample Time GWQC	RW10B J29228-29 5/1/2006 170 12:35	RW11A J29228-30 5/1/2006 115 13:10	RW11B J29228-31 5/1/2006 170 13:15	RW13 J30312-1 5/10/2006 105/115 17:10
Analyte	CAS-RN					
1,1,1-Trichloroethane	71-55-6	30	0.84 J	0.24 U	0.24 U	17.4
1,1-Dichloroethane	75-34-3	50	0.7 U	0.7 U	0.7 U	3.1
Chloroethane	75-00-3	100	0.33 U	0.33 U	0.33 U	0.2 U
Chloroform	67-66-3	6	0.19 U	0.19 U	0.19 U	0.5 U
Benzene	71-43-2	1	0.18 U	0.18 U	0.18 U	0.3 U
Ethylbenzene	100-41-4	700	0.23 U	0.23 U	0.23 U	0.5 U
Toluene	108-88-3	1000	0.31 U	0.31 U	0.31 U	0.4 U
Total Xylenes	1330-20-7	1000	0.25 U	0.25 U	0.25 U	0.4 U
Tetrachloroethene	127-18-4	1	0.28 U	2.6	0.28 U	1.6
Trichloroethylene	79-01-6	1	0.2 U	0.29 J	0.2 U	0.39 J
Trans-1,2-Dichloroethene	156-60-5	100	0.38 U	0.38 U	0.38 U	0.4 U
1,1-Dichloroethylene	75-35-4	2	0.58 U	0.58 U	0.7 J	4.2
cis-1,2-Dichloroethene	156-59-2	70	0.56 U	0.56 U	0.56 U	0.4 U
Vinyl Chloride	75-01-4	5	0.35 U	0.35 U	0.35 U	0.3 U
1,2-Dichloroethane	107-06-2	2	0.48 U	0.48 U	0.48 U	0.3 U
Carbon tetrachloride	56-23-5	2	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	74-87-3	30	0.42 U	0.42 U	0.42 U	0.3 U
Methylene Chloride	75-09-2	3	0.19 U	0.19 U	0.19 U	0.5 U

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Table 3A
MNA Evaluation
Analytical Results
Volatile Organic Compounds
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

Analyte	CAS-RN	Sample ID	RW14A	RW15A	RW15B	RW15C
		Lab ID	J29360-15	J29360-28	J29360-29	J29360-30
		Sample Date	5/2/2006	5/2/2006	5/2/2006	5/2/2006
		Start Depth	140	113	135	156
		Sample Time	9:15	12:35	12:40	12:45
		GWQC				
1,1,1-Trichloroethane	71-55-6	30	4.3	1.1	1.1	1.1
1,1-Dichloroethane	75-34-3	50	7.6	0.7 U	0.7 U	0.7 U
Chloroethane	75-00-3	100	0.33 U	0.33 U	0.33 U	0.33 U
Chloroform	67-66-3	6	0.44 J	0.19 U	0.19 U	0.19 U
Benzene	71-43-2	1	0.18 U	0.18 U	0.18 U	0.18 U
Ethylbenzene	100-41-4	700	0.23 U	0.23 U	0.23 U	0.23 U
Toluene	108-88-3	1000	0.31 U	0.31 U	0.31 U	0.31 U
Total Xylenes	1330-20-7	1000	0.25 U	0.25 U	0.25 U	0.25 U
Tetrachloroethene	127-18-4	1	0.43 J	5.7	4.3	4.5
Trichloroethylene	79-01-6	1	1.2	2.9	2.9	2.9
Trans-1,2-Dichloroethene	156-60-5	100	0.38 U	0.38 U	0.38 U	0.38 U
1,1-Dichloroethylene	75-35-4	2	1.7	0.58 U	0.58 U	0.58 U
cis-1,2-Dichloroethene	156-59-2	70	1.3	5.6	5.7	5.6
Vinyl Chloride	75-01-4	5	0.35 U	0.35 U	0.35 U	0.35 U
1,2-Dichloroethane	107-06-2	2	0.48 U	0.48 U	0.48 U	0.48 U
Carbon tetrachloride	56-23-5	2	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	74-87-3	30	0.42 U	0.42 U	0.42 U	0.42 U
Methylene Chloride	75-09-2	3	0.19 U	0.19 U	0.19 U	0.19 U

Notes:

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Table 3A
MNA Evaluation
Analytical Results
Volatile Organic Compounds
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

		Sample ID	RW16A	RW16B	RW16BP	TH36A
		Lab ID	J29360-46	J29360-47	J29360-48	J29360-16
		Sample Date	5/2/2006	5/2/2006	5/2/2006	5/2/2006
		Start Depth	121	141.5	141.5	110
		Sample Time	15:10	15:15	15:20	9:25
Analyte	CAS-RN	GWQC				
1,1,1-Trichloroethane	71-55-6	30	7.1	2.4 J	2.5	2.7
1,1-Dichloroethane	75-34-3	50	92.6	40.2	41.9	1
Chloroethane	75-00-3	100	1260	940	1050	0.33 U
Chloroform	67-66-3	6	0.19 U	0.47 U	0.47 U	0.19 U
Benzene	71-43-2	1	0.23 J	0.44 U	0.44 U	0.18 U
Ethylbenzene	100-41-4	700	0.23 U	0.57 U	0.57 U	0.23 U
Toluene	108-88-3	1000	0.5 J	0.78 U	0.78 U	0.31 U
Total Xylenes	1330-20-7	1000	0.25 U	0.61 U	0.61 U	0.25 U
Tetrachloroethene	127-18-4	1	0.28 U	0.71 U	0.71 U	0.78 J
Trichloroethylene	79-01-6	1	0.49 J	0.5 U	0.5 U	0.52 J
Trans-1,2-Dichloroethene	156-60-5	100	0.38 U	0.95 U	0.95 U	0.38 U
1,1-Dichloroethylene	75-35-4	2	4.4	3.6	3.7	0.58 U
cis-1,2-Dichloroethene	156-59-2	70	0.56 U	1.4 U	1.4 U	1.3
Vinyl Chloride	75-01-4	5	12.7	8.2	8	0.35 U
1,2-Dichloroethane	107-06-2	2	22.1	13	14	0.48 U
Carbon tetrachloride	56-23-5	2	0.3 U	0.76 U	0.76 U	0.3 U
Chloromethane	74-87-3	30	1.7	1.1 U	1.1 U	0.42 U
Methylene Chloride	75-09-2	3	1.1	2.1 J	2.1 J	0.19 U

Notes:

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Table 3A
MNA Evaluation
Analytical Results
Volatile Organic Compounds
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

Analyte	CAS-RN	Sample ID	THWLSA	THWLSB	THWLSC	THWLSD
		Lab ID	J29360-17	J29360-18	J29360-19	J29360-20
		Sample Date	5/2/2006	5/2/2006	5/2/2006	5/2/2006
		Start Depth	104	110	116	123
		Sample Time	9:40	9:45	9:50	9:55
GWQC						
1,1,1-Trichloroethane	71-55-6	30	66.8	70.6	73.6	96.2
1,1-Dichloroethane	75-34-3	50	128	138	145	188
Chloroethane	75-00-3	100	4.5	5.7	6.6	16.1
Chloroform	67-66-3	6	0.19 U	0.19 U	0.19 U	0.19 U
Benzene	71-43-2	1	0.18 U	0.18 U	0.18 U	0.18 U
Ethylbenzene	100-41-4	700	0.23 U	0.23 U	0.23 U	0.23 U
Toluene	108-88-3	1000	0.31 U	0.31 U	0.31 U	0.31 U
Total Xylenes	1330-20-7	1000	0.25 U	0.25 U	0.25 U	0.25 U
Tetrachloroethene	127-18-4	1	0.36 J	0.48 J	0.36 J	0.43 J
Trichloroethylene	79-01-6	1	2	2.5	2.5	3.3
Trans-1,2-Dichloroethene	156-60-5	100	0.38 U	0.38 U	0.38 U	0.38 U
1,1-Dichloroethylene	75-35-4	2	9	12.1	12.3	18.5
cis-1,2-Dichloroethene	156-59-2	70	1.3	1.7	1.7	2.7
Vinyl Chloride	75-01-4	5	1.4 J	1.8 J	1.9 J	7
1,2-Dichloroethane	107-06-2	2	0.48 U	0.48 U	0.48 U	0.48 U
Carbon tetrachloride	56-23-5	2	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	74-87-3	30	0.42 U	0.42 U	0.42 U	0.42 U
Methylene Chloride	75-09-2	3	0.19 U	0.19 U	0.19 U	0.19 U

Notes:

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Table 3B
MNA Evaluation
2006 Geochemical and Field Parameter Data
Former Ingersoll Rand Facility - Philipsburg, New Jersey

Location ID		MW3	MW4	MW6	MW12
Lab ID		J29228-2	J29228-4	J29228-11	J29360-26
Sample Date		5/1/2006	5/1/2006	5/1/2006	5/2/2006
Start Depth		115	108	187	163
Action Level					
Analyte					
GEOCHEMICAL DATA					
Alkalinity (mg/L)		408	809	292	278
Alkalinity Bicarbonate (mg/L)		407	808	291	277
Alkalinity Carbonate (mg/L)		5 U	5 U	5 U	5 U
Ammonia (as N), Dissolved		0.92	0.32	0.1 U	0.1 U
Chloride (mg/L)	250	30.7	16.4	11.3	39.2
Ethane (µg/L)	100	0.1 U	0.1 U	0.1 U	0.1 U
Ethene (µg/L)	-	0.1 U	0.23	0.1 U	0.1 U
Iron, Ferric (mg/L)		2.9	0.2 U	0.72	6.4
Iron, Ferrous (mg/L)		0.15	0.1 U	0.2 U	0.2 U
Methane (µg/L)		672	9.08	0.1 U	10.1
Nitrite (as N) (mg/L)	1	0.01 U	0.01 U	0.01 U	0.01 U
Nitrate (as N) (mg/L)	10	1.7	0.38	1.6	0.28
Heterotrophic Plate Count (Cfu/mL)		215000	1000 U	550	300
Sulfate (mg/L)	250	107	69.4	469 x	21.3
Sulfide (mg/L)		2 U	2 U	2 U	2 U
FIELD PARAMETERS					
pH (SU)	NA	6.87	6.78	7.16	NR
Temp. (°C)	NA	15.05	16.12	13.69	NR
DO (mg/l)	NA	2.54	1.81	6.42	NR
Cond. (mS/cm)	NA	1.07	1.56	1.37	NR
Turbidity (Ntu)	NA	5.3	0	4.1	NR
ORP (mV)	NA	-101	49	45	NR

NOTES:

x = exceeded criteria

U = non detect

NA = not applicable

J = estimated value

NR indicates that parameter was not analyzed

Table 3B
MNA Evaluation
2006 Geochemical and Field Parameter Data
Former Ingersoll Rand Facility - Philipsburg, New Jersey

Location ID		MW12	MW16	MW18	MW20
Lab ID		J29360-27	J29360-8	J29228-34	J29228-35
Sample Date		5/2/2006	5/2/2006	5/1/2006	5/1/2006
Start Depth		183	155	112	134
Action Level					
Analyte					
GEOCHEMICAL DATA					
Alkalinity (mg/L)		NR	302	234	324
Alkalinity Bicarbonate (mg/L)		NR	301	233	323
Alkalinity Carbonate (mg/L)		NR	5 U	5 U	5 U
Ammonia (as N), Dissolved		NR	0.1 U	0.1 U	0.1 U
Chloride (mg/L)	250	NR	73.4	6.6	12.7
Ethane (µg/L)	100	NR	0.1 U	0.1 U	0.1 U
Ethene (µg/L)	-	NR	0.1 U	0.1 U	0.1 U
Iron, Ferric (mg/L)		NR	0.3 U	1.1	6.4
Iron, Ferrous (mg/L)		NR	0.2 U	0.1 U	0.2 U
Methane (µg/L)		NR	0.1 U	0.1 U	767
Nitrite (as N) (mg/L)	1	NR	0.01 U	0.01 U	0.14
Nitrate (as N) (mg/L)	10	NR	0.74	7.8	0.14
Heterotrophic Plate Count (Cfu/mL)		NR	5500	350	100
Sulfate (mg/L)	250	NR	58.9	29.7	11.3
Sulfide (mg/L)		NR	2 U	2 U	2 U
FIELD PARAMETERS					
pH (SU)	NA	7.29	7.29	7.19	7.18
Temp. (°C)	NA	14.23	17	15.36	13.34
DO (mg/l)	NA	3.12	3.43	5.36	2.49
Cond. (mS/cm)	NA	0.635	0.838	0.543	0.622
Turbidity (Ntu)	NA	186	0	5.1	0
ORP (mV)	NA	-143	-10	90	-187

NOTES:

x = exceeded criteria

U = non detect

NA = not applicable

J = estimated value

NR indicates that parameter was not analyzed

Table 3B
MNA Evaluation
2006 Geochemical and Field Parameter Data
Former Ingersoll Rand Facility - Philipsburg, New Jersey

Location ID		MW30	MW33A	MW34	MW35
Lab ID		J29228-41	J29228-19	J29228-16	J29228-12
Sample Date		5/1/2006	5/1/2006	5/1/2006	5/1/2006
Start Depth		75	107	113	122
Action Level					
Analyte					
GEOCHEMICAL DATA					
Alkalinity (mg/L)		155	306	303	331
Alkalinity Bicarbonate (mg/L)		155	305	302	330
Alkalinity Carbonate (mg/L)		5 U	5 U	5 U	5 U
Ammonia (as N), Dissolved		0.1 U	0.1 U	0.1 U	0.1 U
Chloride (mg/L)	250	59.4	79.8	66.5	29.5
Ethane (µg/L)	100	0.1 U	0.1 U	0.1 U	0.1 U
Ethene (µg/L)	-	0.1 U	0.1 U	0.1 U	0.1 U
Iron, Ferric (mg/L)		0.4	0.2 U	0.2 U	0.2 U
Iron, Ferrous (mg/L)		0.2 U	0.1 U	0.1 U	0.1 U
Methane (µg/L)		0.1 U	0.1 U	0.1 U	0.1 U
Nitrite (as N) (mg/L)	1	0.1 U	0.01 U	0.01 U	0.01 U
Nitrate (as N) (mg/L)	10	0.11 U	3.6	3	2.6
Heterotrophic Plate Count (Cfu/mL)		300	1000	100	500
Sulfate (mg/L)	250	39.6	84.8	66.9	83.9
Sulfide (mg/L)		2 U	2 U	2 U	2 U
FIELD PARAMETERS					
pH (SU)	NA	6.98	7.09	7.13	7.06
Temp. (°C)	NA	13.35	18.95	17.37	14.76
DO (mg/l)	NA	9.61	7.67	6.7	7.44
Cond. (mS/cm)	NA	0.543	1	0.861	0.846
Turbidity (Ntu)	NA	2.3	7.8	0	7.7
ORP (mV)	NA	59	64	83	92

NOTES:

x = exceeded criteria

U = non detect

NA = not applicable

J = estimated value

NR indicates that parameter was not analyzed

Table 3B
MNA Evaluation
2006 Geochemical and Field Parameter Data
Former Ingersoll Rand Facility - Philipsburg, New Jersey

Location ID		MW37	MW42	MW47	MW49
Lab ID		J29228-7	J29629-1	J29228-33	J29360-31
Sample Date		5/1/2006	5/4/2006	5/1/2006	5/2/2006
Start Depth		86	118	136.5	54
Action Level					
Analyte					
GEOCHEMICAL DATA					
Alkalinity (mg/L)		324	241	318	201
Alkalinity Bicarbonate (mg/L)		323	239	317	200
Alkalinity Carbonate (mg/L)		5 U	5 U	5 U	5 U
Ammonia (as N), Dissolved		0.1 U	0.1 U	0.1 U	0.1 U
Chloride (mg/L)	250	10.5	41.9	89	33.4
Ethane (µg/L)	100	0.1 U	0.1 U	0.1 U	0.1 U
Ethene (µg/L)	-	0.1 U	0.1 U	0.1 U	0.1 U
Iron, Ferric (mg/L)		0.2 U	0.2 U	0.81	6
Iron, Ferrous (mg/L)		0.1 U	0.1 U	0.1 U	0.2 U
Methane (µg/L)		0.1 U	0.1 U	23.6	0.1 U
Nitrite (as N) (mg/L)	1	0.01 U	0.01 U	0.01 U	0.01 U
Nitrate (as N) (mg/L)	10	16.4 x	4.4	2.2	7
Heterotrophic Plate Count (Cfu/mL)		26300	100	200	600
Sulfate (mg/L)	250	25.6	25.4	65.2	28
Sulfide (mg/L)		2 U	2 U	2 U	2 U
FIELD PARAMETERS					
pH (SU)	NA	7.26	7.18	6.91	7.3
Temp. (°C)	NA	13.79	13.81	13.43	11.61
DO (mg/l)	NA	7.55	7.93	7.47	8.31
Cond. (mS/cm)	NA	0.771	0.636	0.95	0.563
Turbidity (Ntu)	NA	6.1	12	11.7	22.9
ORP (mV)	NA	75	102	71	81

NOTES:

x = exceeded criteria

U = non detect

NA = not applicable

J = estimated value

NR indicates that parameter was not analyzed

Table 3B
MNA Evaluation
2006 Geochemical and Field Parameter Data
Former Ingersoll Rand Facility - Philipsburg, New Jersey

Location ID		MW51	MW53	RW09	RW13	RW16
Lab ID		J29228-18	J29228-21	J30052-3	J30312-1	J30052-4
Sample Date		5/1/2006	5/1/2006	5/9/2006	5/10/2006	5/9/2006
Start Depth		135	127	119	105	121
Action Level						
Analyte						
GEOCHEMICAL DATA						
Alkalinity (mg/L)		243	764	283	NR	449
Alkalinity Bicarbonate (mg/L)		242	763	283	NR	448
Alkalinity Carbonate (mg/L)		5 U	5 U	5 U	NR	5 U
Ammonia (as N), Dissolved		0.1 U	3.1	0.38	NR	0.96
Chloride (mg/L)	250	51.3	57.2	98.3	NR	245
Ethane (µg/L)	100	0.1 U	0.1 U	4	NR	20.1
Ethene (µg/L)	-	0.1 U	0.1 U	0.94	NR	2.8
Iron, Ferric (mg/L)		13.2	1.1	4.3	NR	7.8
Iron, Ferrous (mg/L)		0.1 U	0.2 U	0.2 U	NR	2
Methane (µg/L)		0.15	3.93	8330	NR	8540
Nitrite (as N) (mg/L)	1	0.01 U	0.01 U	0.01 U	NR	0.01 U
Nitrate (as N) (mg/L)	10	3.5	0.15	0.11 U	NR	0.11 U
Heterotrophic Plate Count (Cfu/mL)		100	2900	1500	NR	2900
Sulfate (mg/L)	250	28.4	16.8	2 U	NR	2 U
Sulfide (mg/L)		2 U	2 U	2 U	NR	2 U
FIELD PARAMETERS						
pH (SU)	NA	7.19	6.69	7.08	7.14	6.78
Temp. (°C)	NA	16.53	19.31	17.41	19.38	17.42
DO (mg/l)	NA	5.97	1.7	2.25	6.34	2.02
Cond. (mS/cm)	NA	0.67	1.49	0.815	0.98	1.74
Turbidity (Ntu)	NA	44.1	34.4	0	9.7	0
ORP (mV)	NA	9	-36	-179	129	-148

NOTES:

x = exceeded criteria

U = non detect

NA = not applicable

J = estimated value

NR indicates that parameter was not analyzed

TABLE 4
MNA Evaluation
Summary of Each Evaluation Tool
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

Well	Location	Screening Results				Trend	Geochemistry	Microbial activity (heterotrophic plate count)	Overall Assessment if NA is occurring
		2005		2006					
		Score	Interpretation	Score	Interpretation				
MW03	South side of Site	2	Inadequate Evidence	5	Inadequate Evidence	Stable with slight temporary increase in 10/2005.	Moderate	Low - high	Low, but stable conditions
MW04	South side of Site	12	Limited Evidence	12	Limited Evidence	Seasonal fluctuations. Ethanes - decreasing trend with minimal fluctuation. Ethenes-fluctuating concentrations within a consistent range.	High	Low	Moderate to high
MW06	Southwest side	4	Inadequate Evidence	0	Inadequate Evidence	Decreasing to stable	Low	Low	Low, but stable conditions
MW12	East of main facility	0	Inadequate Evidence	5	Inadequate Evidence	Data ND	Low	Low	Low
MW16	West side of main facility	5	Inadequate Evidence	5	Inadequate Evidence	Ethenes: Fluctuations with stable periods at later dates. Ethanes: stable with increase of 111-TCA at later dates	Moderate	Low-moderate	Moderate
MW18	East of main facility	0	Inadequate Evidence	-3	Inadequate Evidence	Data ND	Low	Low	Low
MW20	East of main facility	4	Inadequate Evidence	10	Limited Evidence	Data ND	Low-moderate	Low	Low
MW30	South side of Site	-1	Inadequate Evidence	-1	Inadequate Evidence	Data ND	Low	Low	Low
MW33A	Southwest side of Site	3	Inadequate Evidence	-1	Inadequate Evidence	Decreasing trend	Low-moderate	Low-moderate	Moderate
MW34	Southwest side	1	Inadequate Evidence	1	Inadequate Evidence	Decreasing trend	Low-moderate	Low	Moderate

TABLE 4
MNA Evaluation
Summary of Each Evaluation Tool
Former Ingersoll Rand Facility - Philipsburg, New Jersey

Well	Location	Screening Results				Trend	Geochemistry	Microbial activity (heterotrophic plate count)	Overall Assessment if NA is occurring
		2005		2006					
		Score	Interpretation	Score	Interpretation				
MW35	Southwest side of Site	3	Inadequate Evidence	3	Inadequate Evidence	Ethenes - decreasing trend. Ethanes - fluctuating concentrations in consistent range	moderate-high	Low-moderate	Moderate
MW37	South side of Site	-1	Inadequate Evidence	-3	Inadequate Evidence	Decreasing trend for TCE (no DPs). Decreasing trend for carbon tetrachloride.	low	High	Moderate
MW42	Background - north side of site	-3	Inadequate Evidence	-3	Inadequate Evidence	Data ND	low	Low	Low
MW47	Background - north side of site	-3	Inadequate Evidence	-3	Inadequate Evidence	Data ND	low	Low	Low - background well
MW49	South edge of site	-3	Inadequate Evidence	-3	Inadequate Evidence	Data ND	low	Low	Low - background well
MW51A	Southwest side of Site	-2	Inadequate Evidence	-2	Inadequate Evidence	Data ND	low	Low-moderate	Low
MW53	South side of Site	4	Inadequate Evidence	6	Limited Evidence	Data ND	moderate	Moderate-high	Moderate
RW09	Main Facility	21	Strong Evidence	16	Adequate Evidence	Ethenes: slight decreasing trend with fluctuating conc. Ethanes all ND.	High	Low-moderate	High
RW13	West side of main facility	1	Inadequate Evidence	1	Inadequate Evidence	Ethenes - stable Ethanes stable with conc rise in May 2006	moderate	Not sampled	Moderate
RW16	Main Facility	27	Strong Evidence	23	Strong Evidence	Ethanes - stable; Ethenes - stable to decreasing	High	Low-moderate	High

Appendix L

Classification Exception Application

Prepared for:
Ingersoll Rand Company
Montvale, New Jersey

Appendix L

Proposed Interim Classification Exemption Area for the Former Ingersoll Rand Facility in Phillipsburg, New Jersey

ENSR Corporation
January 2007
Document No.: 03710-173-ICEA

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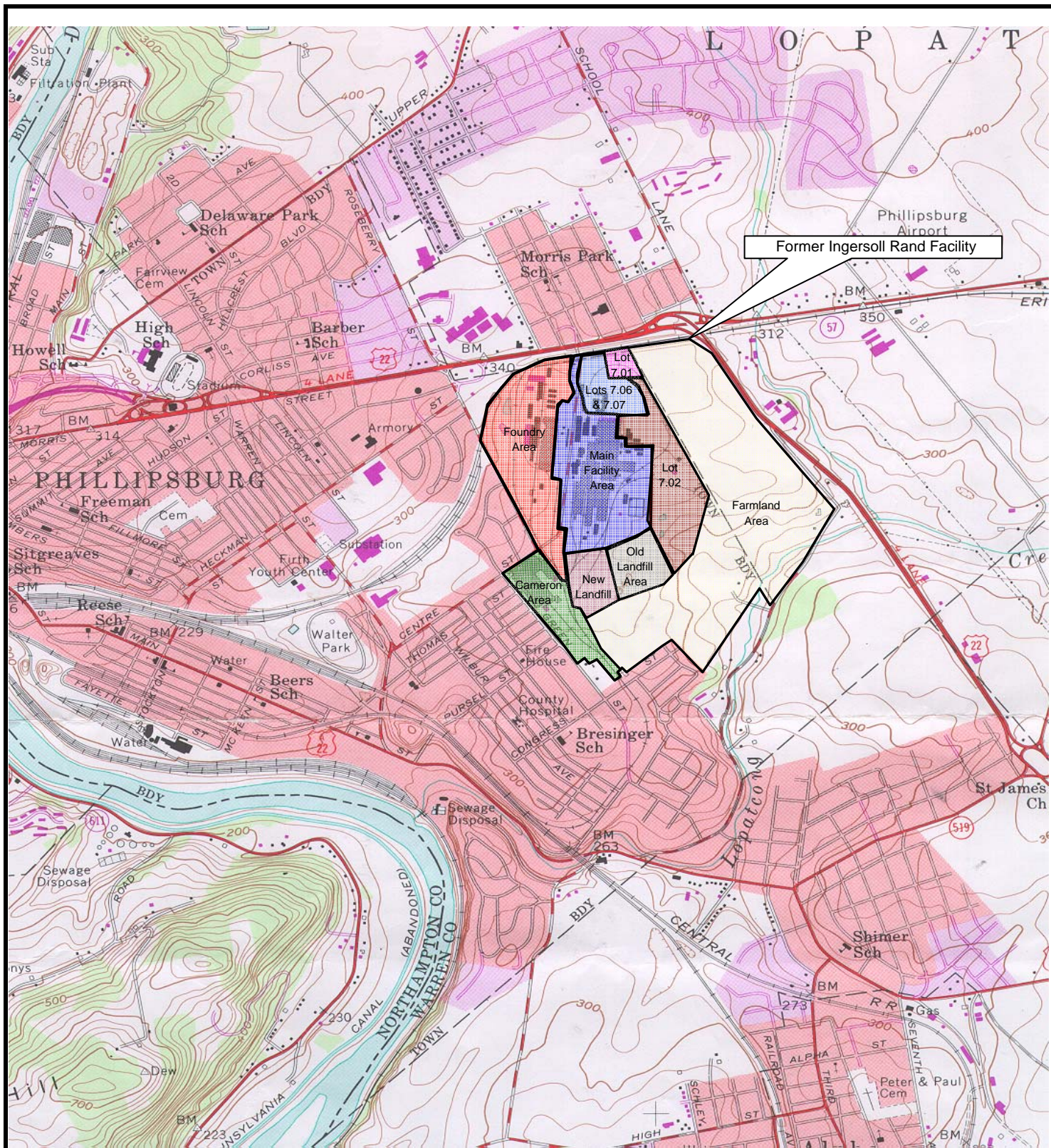
1.0 Introduction

On behalf of Ingersoll Rand Company (“Ingersoll Rand”), ENSR Corporation (“ENSR”) has prepared the following documentation for establishment of an interim Classification Exception Area (“CEA”) for the former Ingersoll Rand facility located in Phillipsburg, New Jersey (hereafter referred to as the “site”). This document has been prepared in response to the March 14, 1994 Administrative Consent Order (“ACO”) between the State of New Jersey and Ingersoll Rand (updated August 10, 2004), which is being administered by the New Jersey Department of Environmental Protection (“NJDEP”) Office of Brownfield Reuse, and pursuant to the NJDEP Technical Requirements for Site Remediation (N.J.A.C. 7:26E-8.3), and the NJDEP Final Guidance on Designation of Classification Exception Areas (November, 1998). The site is shown on the USGS 7.5-minute Topographic Quadrangle Map for Easton, PA-NJ and is included herein as Figure 1-1.

As stipulated by NJDEP Guidance, the New Jersey Ground Water Quality Standards (N.J.A.C. 7:9-6; “GWQS”) provide the basis for the protection of the ambient groundwater quality of the State through the establishment of constituent standards for groundwater pollutants. The intent of CEA establishment is to provide notice that the constituent standards for a given aquifer classification are not or will not be met in a specific localized area and that designated aquifer uses are suspended in the affected area for the term of the CEA. NJDEP formally establishes a CEA under the authority of an oversight document or regulatory program, or as part of a permit approval [see N.J.A.C. 7:9-6.6(a)]. In accordance with N.J.A.C. 7:26E-8.3(a), the Department will establish a groundwater CEA as part of a remedial action for groundwater at a site when the groundwater does not meet the groundwater quality standards, pursuant to N.J.A.C. 7:9-6.

Therefore, the purpose of this document is to supply the NJDEP with the requested information needed for the establishment of a formal CEA designation at the former Ingersoll Rand Facility in Phillipsburg, NJ. Much of the information and supporting documentation for the proposed CEA can be found in the 2006 Annual Groundwater Monitoring Report (“AGWMR”) (ENSR, 2006). Where necessary to support the CEA, information from the AGWMR has been repeated in this document. A Classification Exception Area Fact Sheet is included as Attachment 1. In providing this information, Ingersoll Rand acknowledges that groundwater constituents detected at the site exceed the specific Groundwater Quality Criteria for Class II-A, and proposes to address these conditions through establishment of a CEA for the site.

The remainder of this document includes the following supporting information to the establishment of the CEA. Section 2.0 provides site background detail supporting the development of the CEA. Section 3.0 defines the proposed extent and duration of the CEA. Section 4.0 discusses the implementation details of the CEA. Finally, Section 5.0 provides the references cited herein.



Scale: 1:24,000

Ingersoll Rand Company

Groundwater-Annual Monitoring Report
USGS 7.5' Topographic
Quadrangle - Easton, PA-NJ, 1954 (Photorevised 1981)

Former Ingersoll Rand Facility

942 Memorial Parkway
Phillipsburg, New Jersey

November 2006

Job No. 03710-173

Figure 1-1: Site
Location Map

ENSR | AECOM

2.0 Site background

2.1 Site location and description

The site is located at 942 Memorial Parkway in Phillipsburg, New Jersey, and occupies approximately 385 acres within the Town of Phillipsburg and Lopatcong Township. The facility consists of multiple buildings, foundations of former buildings, roads and parking areas, two landfills, several ponds, landscaped areas, and agricultural fields. A current site map is included as Figure 2-1.

As shown on the USGS 7.5-minute Quadrangle Map for Easton PA-NJ (Figure 1-1), the site is situated at the top of a hill at approximately 360 feet above mean sea level ("AMSL"). Topographic elevation decreases in all directions but is most evident toward the southeast. The facility buildings are present at an approximate elevation of 360 feet AMSL, with the lowest elevations at the site nearing 225 feet AMSL. The facility area is generally level and slopes off steeply towards Roseberry Street on the west side and towards the eastern and southern farm fields.

Surface runoff in the plant area, on paved (impervious) surfaces, is generally channeled into a storm sewer network, which drains the western portion of the site into the Storm Water Retention Basin and the eastern portion of the site into the Spray Pond and Inverse Ponds. Much of the storm water that falls on the remaining permeable surfaces (agricultural fields, lawns, etc.) likely infiltrates to the subsurface.

There are three drainage ditches and four manmade ponds on the former Ingersoll Rand facility. Three of the manmade ponds (the Spray Pond and two Inverse Ponds) and one drainage ditch are adjacent to the Old Landfill to the north and east, and have been determined to be non-jurisdictional water bodies by NJDEP Land Use Regulation Program. Lopatcong Creek is located along the southern property boundary. The Delaware River is located one mile southwest of the facility.

2.2 Site history/Facility operations

Ingersoll Rand began facility construction at the site in 1903 and underwent various expansions and renovations throughout the following 100 years. According to previous reports, the facility supported the manufacture of a variety of drills, compressors, and pumps; assembly of railroad locomotives; various metal working and finishing operations; boiler operations, and general facility maintenance. The facility also maintained an active iron and steel foundry onsite, which was operated to process the raw materials for manufacturing operations.

Facility documentation indicates that manufacturing operations remained largely the same throughout operational history. As part of the drill, compressor, and pump manufacturing process, the Main Facility Area would have received metal castings from the foundry operation to the west. Casts would require finishing via cutting and grinding operations, sand and shot blasting, heat treating, pickling, welding, coating, or painting. The completed drills, pumps, and compressors were tested on site once completed. A few buildings contained large concrete-lined pits to test the pumps and compressor tanks. Drills were tested on large boulders and blocks and were presumably tested in the experimental mine which was also located on the site.

Since 1973, facility operations have been declining. Restructuring activities resulted in closing or moving of almost all previous facility operations. In September 2004, Ingersoll Rand sold the property to PREI (Phillipsburg Associates, LP; Phillipsburg Associates I, LP; Phillipsburg Associates II, LP; and Phillipsburg Associates III, LP).

Currently, the activities conducted on site include pump research and design and assembly and associated activities by FlowServe, Inc. and Curtiss Wright; structural steel fabrication by Stateline; snap ring manufacturing by Truarc; insurance agency called Brown&Brown; cell tower hardware distribution by Eupen;

pharmaceutical research temporary office by Celldex, and school bus operations by Village Bus. Various unused buildings utilized in former manufacturing processes are vacant or have been demolished. A detailed history along with historic site plans was provided in the October 2004 Site History Report ("SHR").

2.3 Current and projected future land and groundwater use

The area surrounding the site is of mixed commercial, residential, and agricultural use. Eastward, the Site is bounded by Route 22. Some commercial development is evident along Route 22, but beyond those businesses, agricultural activities persist. The southern portion of the site is largely bounded by Lock Street and some residential development. Land use beyond Lock Street appears as mixed agricultural and wooded. The northern portion of the Site is bounded by a railroad right of way and Route 22. In this area, Route 22 is heavily developed with commercial and residential structures. The western boundary of the Site at Roseberry, Center, and Green Streets is largely residential with some commercial development.

According to the NJDEP Geographic Information System Resource Data for the Town of Phillipsburg and Lopatcong Township, the site is not located within a sole source aquifer region. Pursuant to N.J.A.C 7:9-6.5, groundwater in this area is designated Class II-A, and can be utilized for potable, agricultural, and industrial use.

Drinking water at the facility was historically provided by three on-site potable water supply wells, labeled WW1, WW2, and WW3. Following the discovery of light non-aqueous phase liquids (LNAPL) on the groundwater table in the mid-1970s, the use of two of these wells was discontinued (i.e., WW2 and WW3). One well, WW1, remained in use with an air stripper to remove dissolved phase organic constituents. Since then, PREI, the new owner of the site, has connected the facility to public water, thus these wells are no longer in use. Potable water at the facility is now provided by Aqua New Jersey, Inc., which is the regulated public utility that provides drinking water and wastewater services to 150,000 residents in 18 municipalities in Warren, Hunterdon, Mercer, Burlington, Monmouth, Ocean, Camden, Gloucester and Sussex counties in NJ (which includes the Town of Phillipsburg).

Inquiries were made with Aqua New Jersey, Inc. regarding a 25-year planning horizon for groundwater use. According to the company, no official planning process has occurred relative to groundwater use in the Phillipsburg area, and thus no official planning document exists. However, Aqua New Jersey, Inc. has reviewed groundwater use in the Phillipsburg area, and has determined that the usage is relatively flat, indicating that they do not anticipate any major changes in groundwater use in the immediate future.

A detailed survey of potable wells in the vicinity of the site (i.e., offsite) was conducted for the AGWMR (ENSR, 2006). The survey is discussed in detail in that report (refer to Sections 3.1.1 and 4.1), and is summarized herein for the purpose of this CEA. It is noted that, with concurrence from the NJDEP, the survey of potable wells outside the Site was conducted for areas downgradient of impacted wells in Cameron Area (i.e., MW34) and the field south of the Old Landfill (i.e., MW37). The survey included a review of records at the NJDEP Bureau of Water Allocation (BWA), county and local records review, ArcView GIS mapping, and a review of tax maps for these areas from the towns of Phillipsburg, Lopatcong, and Pohatcong. Further, several conversations were held with the local water company, Aqua New Jersey Inc. (formerly known as Consumers New Jersey Water Company), who provided a client list consisting of all residents and/or businesses that were connected to city water within the search radius. Based on the information obtained, the well search list was narrowed down to approximately 39 properties that were not identified as being connected to city water. Ultimately, letters were sent to each of these 39 properties requesting confirmation of whether the property was being serviced by potable well(s). Based on the responses, ten property owners confirmed that their properties were being serviced by potable wells. Additional property owners either confirmed a municipal city water connection or noted that the property was vacant. Finally, a windshield survey as well as a "targeted" door-to-door survey was conducted to confirm the presence of a well on several properties in which there was no response received via mail or telephone. These efforts resulted in the identification of 10 potable wells within one-half mile of the Cameron Area and the Old Landfill. These wells are shown on Figure 2-2.

2.4 Environmental investigations

Environmental investigations began voluntarily by Ingersoll Rand in the mid-1970s when LNAPL was discovered on the groundwater table. Subsequent investigations identified a plume of LNAPL at the site. A network of monitoring wells, recovery wells, and test holes has been installed throughout the site to sample soil, monitor groundwater, and recover LNAPL.

In all, these investigations identified 45 individual Areas of Concern (AOCs) and an additional 15 general AOCs that grouped multiple newly identified AOCs within broad classifications (e.g., AOC-54 – former ASTs and USTs). These AOCs are documented and discussed in several previous reports on the site (refer to the 2004 Site History Report and subsequent Site/Remedial Investigation Reports). It is important to note that the AOCs are separated into soil and groundwater AOCs. Due to the sale of the former Ingersoll Rand property to PREI, as well as to accommodate PREI's proposed development at the Site, Ingersoll Rand has accelerated environmental investigations and remedial measures pertaining to soil AOCs in an effort to facilitate the planned redevelopment activities across the Site. Thus, soil impacts across the Site are being addressed separately from groundwater and are being reported in separate submissions to NJDEP.

Of the AOCs identified, several groundwater related AOCs were identified: AOC-18 (MW-5, MW-24, and MW-26 area), AOC-42 (groundwater west of LNAPL Plume), AOC-43 (LNAPL Plume), and AOC-44 (Dissolved Phase Chlorinated Compounds). All groundwater AOCs are now being addressed as part of a site-wide groundwater investigation.

Groundwater analytical data have been historically collected for many of the onsite wells and have been submitted to NJDEP in various reports and presentations. From January 1995 through April 2002, monthly groundwater level and product thickness data were collected for this site and submitted to NJDEP. Since that time, Ingersoll Rand has been collecting water level and product thickness data on a quarterly basis with annual submissions to NJDEP.

Constituents detected in groundwater beneath the site include LNAPL floating on the water table surface and volatile organic compounds (VOCs) (particularly chlorinated solvents).

LNAPL. The LNAPL present on the groundwater table appears to be highly degraded fuel oil, and does not appear to be associated with any constituents dissolved in groundwater. The source of the LNAPL is likely from a number of significant releases of No. 2 fuel oil, which were documented in the facility records starting from the 1940s. Groundwater recovery operations to address LNAPL were started in the 1970s and continue to the present.

The limits of the LNAPL plume have been defined based on the presence of LNAPL detected in individual wells. Groundwater sampling in the vicinity of the LNAPL plume indicates that it is not associated with any dissolved constituents in groundwater, which is consistent with the LNAPL being present in the subsurface for many decades. Further, soil investigations performed between 1996 and 2005 have delineated all petroleum hydrocarbon impacted soil, and proposed remedies have been provided to NJDEP that largely include engineering control as the investigations support the finding of no continuing sources of LNAPL remain at the site.

The distribution of the LNAPL plume is controlled by the bedrock fracture system. As a result of higher permeability along fractures, the plume has migrated primarily to the northeast and southwest. The extent of the plume in these directions is approximately 3000 feet. By contrast, perpendicular to the strike, the plume extent is approximately 500 feet, about one-half the extent parallel to bedrock strike.

Chlorinated VOCs (CVOCs). In contrast to the fuel oil, there were no documented releases of solvents at the facility. Given the type of manufacturing operations, it is possible that chlorinated solvents would have been

used locally and in relatively small volumes. Solvents were not manufactured at the site, and were not used in high volumes in the manufacturing of large, heavy equipment.

No specific source areas for the CVOCs present in groundwater have been identified, despite significant investigation of the soils throughout the Site. Based on the facility documents reviewed, there are a few dispersed operational areas where CVOCs are known or suspected to have been used. Based on soil analytical data to date, there are only a few areas with residual levels of CVOCs present in soil, and there are no apparent continuing sources of CVOCs to groundwater.

Chlorinated VOCs are present in a number of wells at the site, generally at relatively low concentrations (less than about 200 ug/L). They do not form a contiguous plume of CVOCs; instead, they are present in wells sporadically across the site. In addition, in different wells, different groups of CVOCs are present. For example, chlorinated ethenes (tetrachloroethene (PCE), and trichloroethene (TCE)) may dominate in some wells, and chlorinated ethanes (1,1,1-trichloroethane (1,1,1-TCA)) in other wells. This is consistent with the conceptual model (refer to Section 5.0 of the AGWMR-SIR) of relatively small, sporadic releases taking place in local areas around the site, rather than one or more very large spills. The levels of CVOCs at specific wells in excess of NJDEP GWQS are shown on Figure 2-2.

Based on the data from the site, the horizontal extent of the CVOCs has largely been defined. Data from the wells in the Cameron Area suggest CVOCs (both chlorinated ethanes and chlorinated ethenes) may be present in groundwater off-site to the west at levels above the NJDEP groundwater quality standards. However, the extent in this area has not been verified (see below for additional detail). Otherwise, the horizontal extent is defined. In the center of the manufacturing area, the limits to the north, east, and west have been defined. To the southeast, TCE in groundwater extends off-site to domestic wells, being present in one at the NJDEP groundwater quality standard (1.0 ug/l) (see below for additional detail). The extent to the southeast is defined by Lopatcong Creek, which is the regional point of groundwater discharge. Therefore, groundwater will discharge to the creek and not flow any further to the south. This is confirmed by the sampling of domestic wells on the south side of the creek, showing no VOCs present.

Off-site Groundwater. As discussed in Section 2.3 (above), eleven off-site properties were identified as having a potable well (two properties are served by one well). As described in the AGWMR, letters were sent to these property owners requesting written authorization to sample the potable wells; authorization was granted for ten of the eleven properties. Analytical results of the potable well sampling events are shown on Table 2-1.

A first round of groundwater sampling was conducted at the 10 properties on March 10, 2006. Analytical results for the well located at 840 South Main Street reported a TCE concentration of 1.6 ug/L, which was just above the NJDEP GWQS for TCE of 1.0 ug/L. Analytical results for the remaining nine properties reported concentrations which did not exceed the NJDEP GWQS.

Following this sampling event, proper notifications were made to the NJDEP, the Warren County Health Department, and the Mayor of Phillipsburg. Also, Ingersoll Rand authorized ENSR to provide an alternative drinking water source to the residents of 840 South Main Street. On April 9, 2006, ENSR set up an account with Poland Spring to provide coolers and a monthly supply of bottled drinking water to the residents at 840 South Main Street.

A second round of groundwater sampling was conducted on April 11 and 14, 2006 at five wells; each which had the same reported concentrations of TCE as the March 2006 analytical results. Analytical results for the potable well located at 840 South Main Street again reported a concentration of TCE at 1.6 ppb. The remaining four properties reported concentrations which did not exceed the NJDEP GWQS.

Potable well sampling conducted by a third party (in relation to the sale of the property) at the 481 Lock Street property in July 2006 reported TCE at a concentration of 1.6 ppb. ENSR subsequently provided the property owner with bottled water and authorized the delivery service of bottled water by Poland Spring.

The 840 Main Street property was connected to the city water supply in September 2006.

Since city water connection services are not available near the 481 Lock Street residence ENSR evaluated carbon filtration of the chlorinated VOC through the use of a Point-Of-Entry Treatment ("POET") system. With permission from the property owner, ENSR completed oversight of the installation of a POET system at the 481 Lock Street residence in late October 2006.

Following confirmation of the analytical data, the NJDEP assigned new case numbers for the two wells: NJDEP Case No. 0604-07-1420-38 was assigned to 481 Lock Street, Phillipsburg, New Jersey 08865, and NJDEP Case No. 0604-07-1426-38 was assigned to 840 South Main Street, Phillipsburg, New Jersey 08865.

The 481 Lock Street property is immediately adjacent to the former IR facility. The 840 South Main Street property is more than ½ mile from the site boundary and the TCE detected there is not related to the former Ingersoll Rand property. To evaluate other possible sources in the vicinity of the 840 South Main Street property, a database search through Environmental Data Resources (EDR) was conducted to review spills and releases located within a 1-mile radius of 840 South Main Street. This search identified approximately 500 properties within a 1-mile radius. Following the database search, an area-wide canvass was also conducted to confirm locations of these spills and releases in relation to the former Ingersoll Rand property (i.e., review properties that may be between the former Ingersoll Rand property and 840 South Main Street, or otherwise upgradient of the property). Based on these efforts, several properties of interest were identified as having potential sources of TCE, including:

- Properties with vehicle repair and maintenance facilities that may have used TCE as a degreasing agent;
- Properties on NJDEP's Known Contaminated Sites List (KCSL) with previously reported spills/releases or open cases involving similar compounds of concern; or
- Properties with manufacturing operations that may use or have used TCE or similar compounds during daily operations.

Using these criteria, a list of potential offsite sources of TCE impacts to the well located at 840 South Main Street was compiled. Refer to Figure 2-3 for a list and locations of these potential offsite sources of TCE. Several properties were identified in the immediate vicinity or presumed upgradient of 840 South Main Street. Hardison Auto Service and Sales abuts 840 South Main Street, utilizes underground gasoline storage tanks and is listed on the state release database. Additional properties listed on state spills or release databases in the vicinity of 840 Main Street include Tony's Tire Service (located at the corner of Center and Green Streets); Dota Brothers service station (located at the corner of Pursel and Wilbur); and Atlantic States Pipe (located at 183 Sitgreaves Street). Based on the activities conducted at these properties and those listed in the table on Figure 9, these properties should be considered as potential sources of TCE contamination to nearby potable wells.

Previous flooding events in the past two years also have the potential to affect surface and groundwater in the area near the site. These flood waters likely have an effect on the migration of contaminants both on the surface and in the underlying groundwater. A further assessment of the geologic properties of the area would be necessary to determine the actual effects of flooding

TCE is a common contaminant which could originate from a variety of sources. Therefore, its presence at 840 South Main Street does not prove conclusively that it is related to the former Ingersoll Rand facility. Instead, it is more accurate to state that, based on groundwater analytical data collected at the Site, chlorinated VOC impacts remain undelineated at the southwest and southern borders of the site. Ingersoll Rand has proposed the installation of an offsite monitoring well southwest of the former facility and anticipates installation of this well in mid-2007.

TABLE 2-1
Summary of Analytical Results - Volatile Organic Compounds
Offsite Potable Well Groundwater Sampling
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

Analyte	CAS-RN	Location ID	1126MEL	425LOCK	425LOCK	437LOCK	437LOCK
		Lab ID Sample Date	715193 3/10/2006	715188 3/10/2006	726515 4/14/2006	715166 3/10/2006	725158 4/11/2006
		GWQS					
1,1,1,2-Tetrachloroethane	630-20-6	10	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,1-Trichloroethane	71-55-6	30	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	79-34-5	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	79-00-5	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	75-34-3	50	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethylene	75-35-4	2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloropropanone	513-88-2	-	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,1-Dichloropropene	563-58-6	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichlorobenzene	87-61-6	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichloropropane	96-18-4	2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	120-82-1	9	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trimethylbenzene	95-63-6	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dibromo-3-Chloropropane	96-12-8	1	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	95-50-1	600	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	107-06-2	2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	78-87-5	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3,5-Trimethylbenzene	108-67-8	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichlorobenzene	541-73-1	600	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichloropropane	142-28-9	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	106-46-7	75	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1-Chlorobutane	109-69-3	-	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
2,2-Dichloropropane	594-20-7	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Chlorotoluene	95-49-8	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Hexanone	591-78-6	100	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
2-Nitropropane	79-46-9	-	25 U	25 U	25 U	25 U	25 U
4-Chlorotoluene	106-43-4	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
4-Methyl-2-Pentanone	108-10-1	400	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Acetone	67-64-1	700	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Acrylonitrile	107-13-1	50	25 U	25 U	25 U	25 U	25 U
Allyl Chloride	107-05-1	-	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Benzene	71-43-2	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromobenzene	108-86-1	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromodichloromethane	75-27-4	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	75-25-2	4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromomethane	74-83-9	10	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon Disulfide	75-15-0	800	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Carbon tetrachloride	56-23-5	2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroacetonitrile	107-14-2	-	25 U	25 U	25 U	25 U	25 U
Chlorobenzene	108-90-7	50	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobromomethane	74-97-5	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	75-00-3	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	67-66-3	6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloromethane	74-87-3	30	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,2-Dichloroethene	156-59-2	70	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	10061-01-5	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	124-48-1	10	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromoethane	106-93-4	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dichlorodifluoromethane	75-71-8	1000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Diethyl Ether	60-29-7	1000	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Ethyl methacrylate	97-63-2	-	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Ethylbenzene	100-41-4	700	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Hexachlorobutadiene	87-68-3	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Hexachloroethane	67-72-1	10	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Iodomethane	74-88-4	-	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Isopropylbenzene	98-82-8	800	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl Acrylate	96-33-3	-	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Methyl Acrylonitrile	126-98-7	-	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Methyl Ethyl Ketone (MEK)	78-93-3	300	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Methyl methacrylate	80-62-6	-	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Methyl Tertiary Butyl Ether (MTBE)	1634-04-4	70	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene bromide	74-95-3	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	75-09-2	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
N/Aphthalene	91-20-3	300	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
n-Butylbenzene	104-51-8	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Nitrobenzene	98-95-3	10	25 U	25 U	25 U	25 U	25 U
Pentachloroethane	76-01-7	-	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
p-Isopropyltoluene	99-87-6	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Propionitrile	107-12-0	-	25 U	25 U	25 U	25 U	25 U
Propyl benzene	103-65-1	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
sec-Butylbenzene	135-98-8	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	100-42-5	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
t-1,2-Dichloro-2-butene	110-57-6	-	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
tert-Butylbenzene	98-06-6	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene	127-18-4	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrahydrofuran	109-99-9	20	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Toluene	108-88-3	1000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Total Xylenes	1330-20-7	1000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trans-1,2-Dichloroethene	156-60-5	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	10061-02-6	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethylene	79-01-6	1	0.5 U	0.7	0.6	0.7	0.7
Trichlorofluoromethane	75-69-4	2000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl Chloride	75-01-4	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Notes:

All results are reported in milligrams per kilogram (µg/L).

GWQS are the NJDEP Groundwater Quality Standards.

BOLD values indicate exceedances of the GWQC.

UNDERLINED values indicate the Method Detection Limit (MDL) exceeds the GWQC.

CAS-RN = Chemical Abstract Service Registry Number.

U = Indicates that the analyte was not detected at the reported MDL.

TABLE 2-1
Summary of Analytical Results - Volatile Organic Compounds
Offsite Potable Well Groundwater Sampling
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

Analyte	CAS-RN	Location ID	441LOCK	441LOCK	476LOCK	480LOCK	481LOCK
		Lab ID Sample Date	715165 3/10/2006	725183 4/11/2006	715155 3/10/2006	715189 3/10/2006	715154 3/10/2006
		GWQS					
1,1,1,2-Tetrachloroethane	630-20-6	10	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,1-Trichloroethane	71-55-6	30	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	79-34-5	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	79-00-5	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	75-34-3	50	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethylene	75-35-4	2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloropropanone	513-88-2	-	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,1-Dichloropropene	563-58-6	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichlorobenzene	87-61-6	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichloropropane	96-18-4	2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	120-82-1	9	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trimethylbenzene	95-63-6	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dibromo-3-Chloropropane	96-12-8	1	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	95-50-1	600	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	107-06-2	2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	78-87-5	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3,5-Trimethylbenzene	108-67-8	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichlorobenzene	541-73-1	600	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichloropropane	142-28-9	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	106-46-7	75	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1-Chlorobutane	109-69-3	-	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
2,2-Dichloropropane	594-20-7	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Chlorotoluene	95-49-8	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Hexanone	591-78-6	100	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
2-Nitropropane	79-46-9	-	25 U	25 U	25 U	25 U	25 U
4-Chlorotoluene	106-43-4	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
4-Methyl-2-Pentanone	108-10-1	400	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Acetone	67-64-1	700	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Acrylonitrile	107-13-1	50	25 U	25 U	25 U	25 U	25 U
Allyl Chloride	107-05-1	-	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Benzene	71-43-2	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromobenzene	108-86-1	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromodichloromethane	75-27-4	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	75-25-2	4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromomethane	74-83-9	10	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon Disulfide	75-15-0	800	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Carbon tetrachloride	56-23-5	2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroacetonitrile	107-14-2	-	25 U	25 U	25 U	25 U	25 U
Chlorobenzene	108-90-7	50	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobromomethane	74-97-5	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	75-00-3	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	67-66-3	6	0.5 U	0.5 U	0.6	0.5 U	0.5 U
Chloromethane	74-87-3	30	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,2-Dichloroethene	156-59-2	70	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	10061-01-5	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	124-48-1	10	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromoethane	106-93-4	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dichlorodifluoromethane	75-71-8	1000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Diethyl Ether	60-29-7	1000	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Ethyl methacrylate	97-63-2	-	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Ethylbenzene	100-41-4	700	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Hexachlorobutadiene	87-68-3	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Hexachloroethane	67-72-1	10	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Iodomethane	74-88-4	-	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Isopropylbenzene	98-82-8	800	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl Acrylate	96-33-3	-	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Methyl Acrylonitrile	126-98-7	-	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Methyl Ethyl Ketone (MEK)	78-93-3	300	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Methyl methacrylate	80-62-6	-	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Methyl Tertiary Butyl Ether (MTBE)	1634-04-4	70	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene bromide	74-95-3	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	75-09-2	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
N/Aphthalene	91-20-3	300	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
n-Butylbenzene	104-51-8	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Nitrobenzene	98-95-3	10	25 U	25 U	25 U	25 U	25 U
Pentachloroethane	76-01-7	-	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
p-Isopropyltoluene	99-87-6	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Propionitrile	107-12-0	-	25 U	25 U	25 U	25 U	25 U
Propyl benzene	103-65-1	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
sec-Butylbenzene	135-98-8	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	100-42-5	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
t-1,2-Dichloro-2-butene	110-57-6	-	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
tert-Butylbenzene	98-06-6	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene	127-18-4	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrahydrofuran	109-99-9	20	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Toluene	108-88-3	1000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Total Xylenes	1330-20-7	1000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trans-1,2-Dichloroethene	156-60-5	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	10061-02-6	-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethylene	79-01-6	1	0.6	0.6	0.5 U	0.5 U	1
Trichlorofluoromethane	75-69-4	2000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl Chloride	75-01-4	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Notes:

All results are reported in milligrams per kilogram (µg/L).

GWQS are the NJDEP Groundwater Quality Standards.

BOLD values indicate exceedances of the GWQC.

UNDERLINED values indicate the Method Detection Limit (MDL) exceeds the GWQC.

CAS-RN = Chemical Abstract Service Registry Number.

U = Indicates that the analyte was not detected at the reported MDL.

TABLE 2-1
Summary of Analytical Results - Volatile Organic Compounds
Offsite Potable Well Groundwater Sampling
Former Ingersoll Rand Facility - Phillipsburg, New Jersey

Analyte	CAS-RN	Location ID	481LOCK	700LOCK	840SMST	840SMST
		Lab ID Sample Date	725184 4/11/2006	715190 3/10/2006	715152 3/10/2006	725163 4/11/2006
		GWQS				
1,1,1,2-Tetrachloroethane	630-20-6	10	0.5 U	0.5 U	0.5 U	0.5 U
1,1,1-Trichloroethane	71-55-6	30	0.5 U	0.5 U	0.9	0.9
1,1,2,2-Tetrachloroethane	79-34-5	1	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	79-00-5	3	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	75-34-3	50	0.5 U	0.5 U	0.5 U	0.5
1,1-Dichloroethylene	75-35-4	2	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloropropanone	513-88-2	-	2.5 U	2.5 U	2.5 U	2.5 U
1,1-Dichloropropene	563-58-6	-	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichlorobenzene	87-61-6	-	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichloropropane	96-18-4	2	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	120-82-1	9	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trimethylbenzene	95-63-6	100	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dibromo-3-Chloropropane	96-12-8	1	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	95-50-1	600	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	107-06-2	2	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	78-87-5	1	0.5 U	0.5 U	0.5 U	0.5 U
1,3,5-Trimethylbenzene	108-67-8	100	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichlorobenzene	541-73-1	600	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichloropropane	142-28-9	100	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	106-46-7	75	0.5 U	0.5 U	0.5 U	0.5 U
1-Chlorobutane	109-69-3	-	2.5 U	2.5 U	2.5 U	2.5 U
2,2-Dichloropropane	594-20-7	-	0.5 U	0.5 U	0.5 U	0.5 U
2-Chlorotoluene	95-49-8	-	0.5 U	0.5 U	0.5 U	0.5 U
2-Hexanone	591-78-6	100	2.5 U	2.5 U	2.5 U	2.5 U
2-Nitropropane	79-46-9	-	25 U	25 U	25 U	25 U
4-Chlorotoluene	106-43-4	-	0.5 U	0.5 U	0.5 U	0.5 U
4-Methyl-2-Pentanone	108-10-1	400	2.5 U	2.5 U	2.5 U	2.5 U
Acetone	67-64-1	700	2.5 U	2.5 U	2.5 U	2.5 U
Acrylonitrile	107-13-1	50	25 U	25 U	25 U	25 U
Allyl Chloride	107-05-1	-	2.5 U	2.5 U	2.5 U	2.5 U
Benzene	71-43-2	1	0.5 U	0.5 U	0.5 U	0.5 U
Bromobenzene	108-86-1	-	0.5 U	0.5 U	0.5 U	0.5 U
Bromodichloromethane	75-27-4	1	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	75-25-2	4	0.5 U	0.5 U	0.5 U	0.5 U
Bromomethane	74-83-9	10	0.5 U	0.5 U	0.5 U	0.5 U
Carbon Disulfide	75-15-0	800	2.5 U	2.5 U	2.5 U	2.5 U
Carbon tetrachloride	56-23-5	2	0.5 U	0.5 U	0.5 U	0.5 U
Chloroacetonitrile	107-14-2	-	25 U	25 U	25 U	25 U
Chlorobenzene	108-90-7	50	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobromomethane	74-97-5	-	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	75-00-3	100	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	67-66-3	6	0.5 U	0.5 U	0.5 U	0.5 U
Chloromethane	74-87-3	30	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,2-Dichloroethene	156-59-2	70	0.5 U	0.5 U	0.5 U	0.5
cis-1,3-Dichloropropene	10061-01-5	-	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	124-48-1	10	0.5 U	0.5 U	0.5 U	0.5 U
Dibromoethane	106-93-4	-	0.5 U	0.5 U	0.5 U	0.5 U
Dichlorodifluoromethane	75-71-8	1000	0.5 U	0.5 U	0.5 U	0.5 U
Diethyl Ether	60-29-7	1000	2.5 U	2.5 U	2.5 U	2.5 U
Ethyl methacrylate	97-63-2	-	2.5 U	2.5 U	2.5 U	2.5 U
Ethylbenzene	100-41-4	700	0.5 U	0.5 U	0.5 U	0.5 U
Hexachlorobutadiene	87-68-3	1	0.5 U	0.5 U	0.5 U	0.5 U
Hexachloroethane	67-72-1	10	2.5 U	2.5 U	2.5 U	2.5 U
Iodomethane	74-88-4	-	2.5 U	2.5 U	2.5 U	2.5 U
Isopropylbenzene	98-82-8	800	0.5 U	0.5 U	0.5 U	0.5 U
Methyl Acrylate	96-33-3	-	2.5 U	2.5 U	2.5 U	2.5 U
Methyl Acrylonitrile	126-98-7	-	2.5 U	2.5 U	2.5 U	2.5 U
Methyl Ethyl Ketone (MEK)	78-93-3	300	2.5 U	2.5 U	2.5 U	2.5 U
Methyl methacrylate	80-62-6	-	2.5 U	2.5 U	2.5 U	2.5 U
Methyl Tertiary Butyl Ether (MTBE)	1634-04-4	70	0.5 U	0.5 U	0.5 U	0.5 U
Methylene bromide	74-95-3	-	0.5 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	75-09-2	3	0.5 U	0.5 U	0.5 U	0.5 U
N/Aphthalene	91-20-3	300	0.5 U	0.5 U	0.5 U	0.5 U
n-Butylbenzene	104-51-8	100	0.5 U	0.5 U	0.5 U	0.5 U
Nitrobenzene	98-95-3	10	25 U	25 U	25 U	25 U
Pentachloroethane	76-01-7	-	2.5 U	2.5 U	2.5 U	2.5 U
p-Isopropyltoluene	99-87-6	100	0.5 U	0.5 U	0.5 U	0.5 U
Propionitrile	107-12-0	-	25 U	25 U	25 U	25 U
Propyl benzene	103-65-1	100	0.5 U	0.5 U	0.5 U	0.5 U
sec-Butylbenzene	135-98-8	-	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	100-42-5	100	0.5 U	0.5 U	0.5 U	0.5 U
t-1,2-Dichloro-2-butene	110-57-6	-	2.5 U	2.5 U	2.5 U	2.5 U
tert-Butylbenzene	98-06-6	-	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene	127-18-4	1	0.5 U	0.5 U	0.5 U	0.5 U
Tetrahydrofuran	109-99-9	20	2.5 U	2.5 U	2.5 U	2.5 U
Toluene	108-88-3	1000	0.5 U	0.5 U	0.5 U	0.5 U
Total Xylenes	1330-20-7	1000	0.5 U	0.5 U	0.5 U	0.5 U
Trans-1,2-Dichloroethene	156-60-5	100	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	10061-02-6	-	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethylene	79-01-6	1	1	0.5 U	1.6	1.6
Trichlorofluoromethane	75-69-4	2000	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl Chloride	75-01-4	5	0.5 U	0.5 U	0.5 U	0.5 U

Notes:

All results are reported in milligrams per kilogram (µg/L).

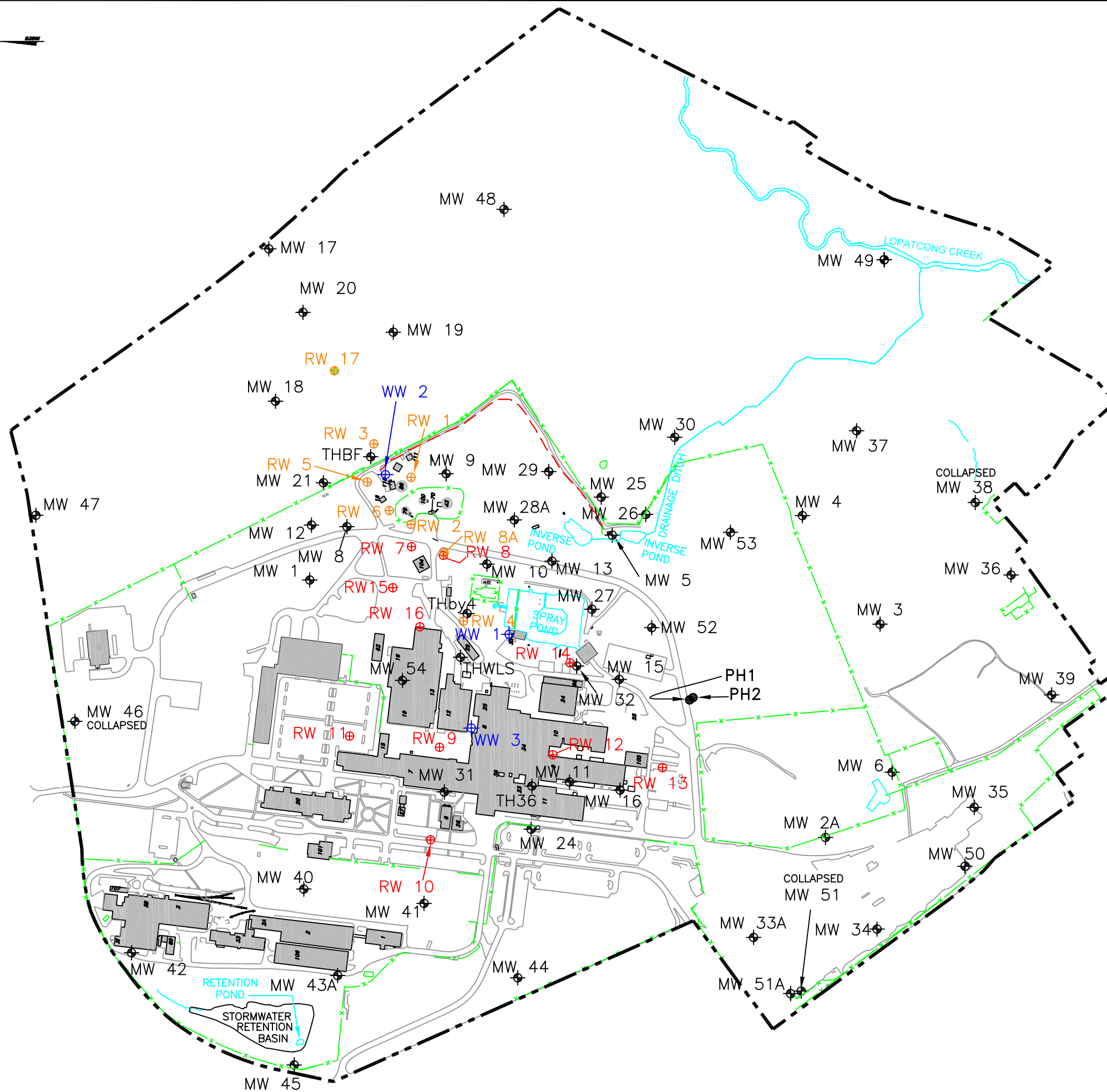
GWQS are the NJDEP Groundwater Quality Standards.

BOLD values indicate exceedances of the GWQC.









UNDERLINED values indicate the Method Detection Limit (MDL) exceeds the GWQC.

CAS-RN = Chemical Abstract Service Registry Number.

U = Indicates that the analyte was not detected at the reported MDL.

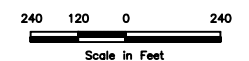


LEGEND

-  MONITORING WELL
 ACTIVE RECOVERY WELL
 RECOVERY WELL
 PRODUCTION WELL
 BOREHOLE
 SURFACE WATER/FEATURES AND DRAINAGE
 EXISTING FENCELINE
 FORMER INGERSOLL RAND PROPERTY BOUNDARY

NOTES:

1. LOCATIONS OF BASEMAP AND STRUCTURES SHOWN ARE BASED ON SURVEYED MAP IN STATE PLANE NAD83, FEET
2. PROPERTY LINES SHOWN HEREON ARE BASED ON A DRAWING ENTITLED "SURVEY OF LANDS FOR INGERSOLL - RAND CO.," PREPARED BY STUDER & McELDOWNY, P.A., DRAWING NO. 1590-G, DATED AUGUST 15, 2003; AND ON A DRAWING ENTITLED "SURVEY OF LANDS FOR INGERSOLL - RAND COMPANY," PREPARED BY STUDER & McELDOWNY, P.A., DRAWING NO. 1147-G, DATED FEBRUARY 7, 1992, LAST REVISED JUNE 15, 1992.
3. WELL LOCATIONS ARE APPROXIMATE.



UNIFORMED BY:	NO.:	DESCRIPTION:	DATE:	BY:
JH				
DRAWN BY:				
/JK				
CHECKED BY:				
APPROVED BY:				

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**SITE PLAN WITH MONITORING
& RECOVERY WELL LOCATIONS**
FORMER INGERSOLL RAND FACILITY
PHILLIPSBURG, NEW JERSEY

SOURCE	DATE	PROJECT NUMBERS
AS SHOWN	09/14/06	03710-173

FIGURE NUMBER:

2-1

SHEET NUMBER:
1 of 1



POTABLE WELL SAMPLE RESULTS

Property Location	March 10 Results (ppb)	April 11 Results (ppb)	July Results (ppb)
476 LOCK STREET	Chloroform = 0.6	Chloroform = 0.6	Not Analyzed
481 LOCK STREET	TCE = 1	TCE = 1	TCE = 1.6
441 LOCK STREET	TCE = 0.6	TCE = 0.6	Not Analyzed
437 LOCK STREET	TCE = 0.7	TCE = 0.7	Not Analyzed
425 LOCK STREET	TCE = 0.7	TCE = 0.6	Not Analyzed

Legend	
	SURFACE WATER/ FEATURES AND DRAINAGE
	FORMER INGERSOLL RAND PROPERTY BOUNDARY
	EXISTING FENCELINE
	MONITORING WELL
	RECOVERY WELL
	PRODUCTION WELL
	OFF-SITE WELL

NOTES:

- MW6, MW12, MW15, MW24, RW10 AND THWLS WERE RETROFITTED
- LOCATIONS OF BASEMAP AND STRUCTURES SHOWN ARE BASED ON SURVEYED MAP IN STATE PLANE NAD83, FEET
- PROPERTY LINES SHOWN HEREON ARE BASED ON A DRAWING ENTITLED "SURVEY OF LANDS FOR INGERSOLL - RAND CO.," PREPARED BY STUDER & McELDOWNEY, P.A., DRAWING NO. 1590-G, DATED AUGUST 15, 2003; AND ON A DRAWING ENTITLED "SURVEY OF LANDS FOR INGERSOLL - RAND COMPANY," PREPARED BY STUDER & McELDOWNEY, P.A., DRAWING NO. 1147-G, DATED FEBRUARY 7, 1992, LAST REVISED JUNE 15, 1992.

RW15	PCE		TCE	
	10/11/2005	5/2/2006	10/11/2005	5/2/2006
113	1.8	5.7	1.8	2.9
135	1.8	4.3	2.6	2.9
156	2	4.5	2.7	2.9

RW16	1,1,1-TCA		1,1-DCA		1,1-DCE	
	10/11/2005	5/2/2006	10/11/2005	5/2/2006	10/11/2005	5/2/2006
121	91	7.1	620	92.6	21	4.4
141.5	49/44	2.4/2.5	360/340	40.2/41.9	3.4/3.2	3.6/3.7
VC	1,2-DCA		CIETH		TCE	
	10/11/2005	5/2/2006	10/11/2005	5/2/2006	10/11/2005	5/2/2006
121	2.9 U	22.1	840	1260	3.7 U	0.49
141.5	1.4 U/8.3	13/14	320/280	940/1050	5.7/5.1	2.5 U/ 2.5 U

MW37	CT		TCE	
	10/10/2005	5/1/2006	10/10/2005	5/1/2006
60	1	1.5	8.2	11.6
86	1.8	0.58	15	4.7
98	3.4	2.7/2.3	23	17.4/15.1

MW04	cis-1,2-DCE		PCE		TCE		VC	
	10/10/2005	5/1/2006	10/10/2005	5/1/2006	10/10/2005	5/1/2006	10/10/2005	5/1/2006
96	72	42.7	7.4	6.7	20	13.9	34	18.9
108	75	52.9	7.1	16.6	21	17.3	34	25.2
120	81	51.8	7.8	9.4	22	16.8	37	24.9

RW14	TCE	
	10/10/2005	5/2/2006
140	NS	1.2
165	NS	NS

MW32	1,1-DCE		TCE	
	10/10/2005	5/2/2005	10/10/2005	5/2/2005
118	2.4	2.1	2.4	1.2
129	2.2	1.6	2.2	1.4

PH1	PCE		TCE	
	10/10/2005	5/2/2005	10/10/2005	5/2/2005
182	0.28 U	0.2 U		
225	106	183		
276	98.6	70.9		
297	0.28 U	0.2 U		

MW15	1,1-DCE		PCE		TCE	
	10/20/2005	5/2/2006	10/20/2005	5/2/2006	10/20/2005	5/2/2006
conv / 98	2.1	NS	1.2	NS	1.5	NS
130	NS	0.76 U	NS	0.28 U	NS	0.2 U
136	NS	0.58 U	NS	0.28 U	NS	0.2 U

MW06	1,1,1-TCA		1,1-DCE		TCE	
	10/10/2005	5/1/2006	10/10/2005	5/1/2006	10/10/2005	5/1/2006
110	54	NS	2.9	NS	3.4	NS
145	55	NS	3.3	NS	3.8	NS
172	NS	1.1	NS	0.58 U	NS	0.24
187	66	6.3	3	1.5	3.7	1.3

MW35	1,1,1-TCA		1,1-DCE		PCE		TCE	
	10/10/2005	5/1/2006	10/10/2005	5/1/2006	10/10/2005	5/1/2006	10/10/2005	5/1/2006
122	88	88.9	5	4.2	2.3	2.5	8.1	6.3
128	57	82.4	3.6	4.2	2.2	2.4	6.5	5.8

MW34	PCE		TCE	
	10/10/2005	5/1/2006	10/10/2005	5/1/2006
108	0.8	0.9	2.7	2.7
113	1	1.1	2.7	2.8
120	1.9	1.7	3	2.6

MW16	1,1-DCE	
	10/11/2005	5/2/2006
130	4.6	4.9
155	3.3/2.5	3.6/4
190	3.3	3.9

RW13	PCE	
	10/19/2005	5/10/2006
conv / 115	1.6	NS
conv / 105	NS	1.5

TH36	PCE		TCE	
	10/10/2005	5/2/2006	10/10/2005	5/2/2006
110	1.1	0.78	0.8	0.52

WW3	TCE		VC	
	5/2/2005	5/2/2006	5/2/2005	5/2/2006
98	0.2 U	0.35 U		
215	0.2 U	0.35 U		
292	2	14.2		
341	1.7	10.5		
472	1.5	10.9		
615	0.98 U	6.1		
725	1.3	10.3		
757	1.2/1.3	10/10.8		

THWLS	1,1,1-TCA		1,1-DCA		1,1-DCE		TCE	
	10/10/2005	5/2/2006	10/10/2005	5/2/2006	10/10/2005	5/2/2006	10/10/2005	5/2/2006
104	NS	66.8	NS	128	NS	9	NS	2
110	NS	70.6	NS	138	NS	12.1	NS	2.5
116	NS	73.6	NS	145	NS	12.3	NS	2.5
123	NS	96.2	NS	188	NS	18.5	NS	3.3

RW11	PCE	
	10/10/2005	5/1/2006
115	2.7	2.6
170	0.4 U	0.28 U

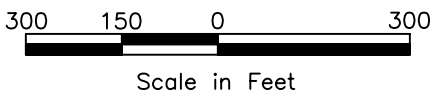
RW09	1,1-DCE		cis-1,2-DCE		TCE		PCE		VC	
	10/11/2005	5/2/2006	10/11/2005	5/2/2006	10/11/2005	5/2/2006	10/11/2005	5/2/2006	10/11/2005	5/2/2006
90	1.9	1.4	380	151	4.7	2.4	3.9	1.6	73	91.1
118	1.8 U	1.3	330	165	4.8	2.3	4.2	2	66	50.8
147	2.2	1.5	370	173	2.6	2.4	2.2 U	1.4	79	71.3
160	0.7 U	0.83 U	55	141	0.7 U	0.20 U	0.7 U	0.28 U	180	169
188	0.4 U/0.4 U	0.58 U	12	1.1	0.8	0.20 U	0.4 U	0.28 U	93	14.6

KEY:

Well ID		Analyte	Sample Date	Results in ug/L.
Sample Depth in Feet	RW11	PCE	10/10/2005	5/1/2006
	115	2.7	2.6	
	170	0.4 U	0.28 U	

Bold indicates exceedance of NJDEP Ground Water Quality Standards (GWQS).

Compound	Abbreviation	GWQS
1,1,1-Trichloroethane	1,1,1-TCA	30
1,1,2-Trichloroethane	1,1,2-TCA	3
1,1-Dichloroethane	1,1-DCA	50
1,1-Dichloroethylene	1,1-DCE	2
1,2-Dichloroethane	1,2-DCA	2
Carbon Tetrachloride	CT	2
Chloroethane	CIETH	100
cis-1,2-Dichloroethene	cis-1,2-DCE	70
Tetrachloroethene	PCE	1
Trichloroethylene	TCE	1
Vinyl Chloride	VC	5



WELL LOCATIONS WHERE CONSTITUENTS OF CONCERN EXCEED NJDEP GROUNDWATER QUALITY STANDARDS

FORMER INGERSOLL RAND FACILITY
PHILLIPSBURG, NEW JERSEY

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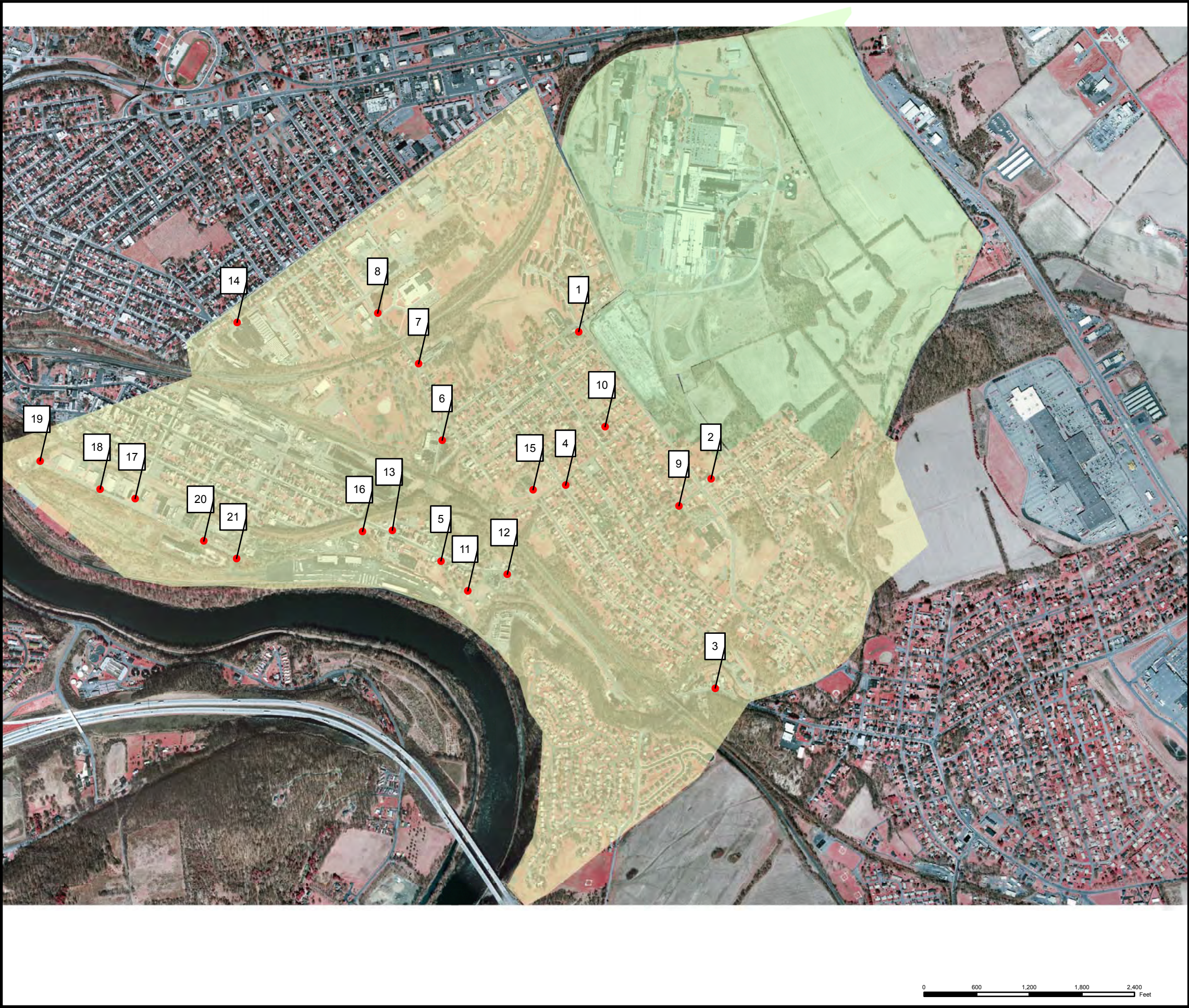
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PISCATAWAY, NEW JERSEY 08854
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FAX: (732) 981-0116
WEB: HTTP://WWW.ENSR.AECOM.COM

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NSO			
DRAWN BY:	NO.:	DATE:	BY:
/jk			
CHECKED BY:	NO.:	DATE:	BY:
APPROVED BY:	NO.:	DATE:	BY:

FIGURE NUMBER:

2-2

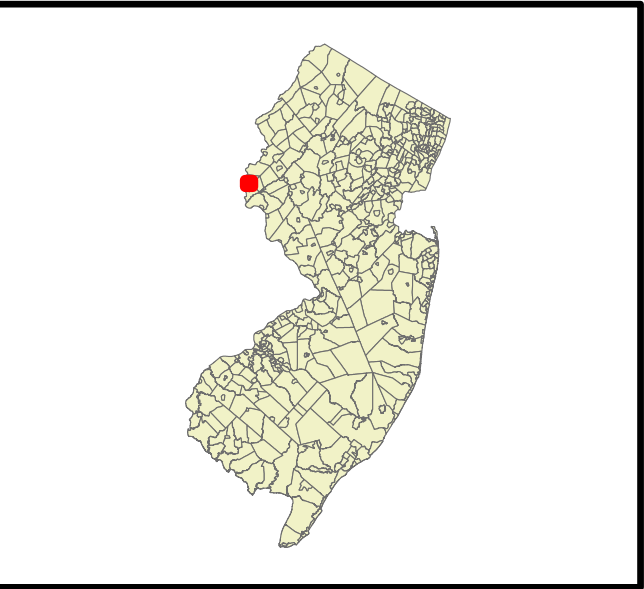
SHEET NUMBER:
1 of 1



LEGEND

- Area of Interest
- Former Ingersoll Rand Facility
- Potential Offsite Source Locations

Source ID	Description
1	Tony's Tire Service
2	Private Garage
3	Agw ay
4	Former service station (Dota)
5	Kw ik trip & s.main w heel&brake
6	NJ Strand&Cable/Big Sky Ind.
7	Keystone packaging
8	Orbel
9	Classic Creations Woodw ork
10	Possible industrial conversion
11	Water Treatment Facility
12	Hardison Property/Auto Service&S
13	Gulf&used cars
14	Hi QU Italian-American Stone
15	Flynn's
16	Karl's Glass & Mirror
17	Royalox
18	Zappa plastic / micro molding
19	Phillipsburg pistol club
20	Abandoned mfg facility
21	Fasco/R.Craft/MWs in street



SCALE: AS SHOWN
DATE: 07/26/2006
PROJECT NUMBER: 03710-0907

FIGURE NUMBER:
2-3
SHEET NUMBER:
1 of 1

ENSIR CORPORATION
30 NEW ENGLAND AVENUE
PHILADELPHIA, PA 19106
PHONE: (215) 981-0200
FAX: (215) 981-0111
WWW.ENSIR.COM

DESIGNED BY:	GRM	NO.	DESCRIPTION:	DATE:	BY:



3.0 Proposed interim classification exemption area

3.1 Constituents of concern

Constituents of concern for the site, and for which the interim CEA will be established, include those constituents reported in groundwater at concentrations in excess of NJDEP GWQS. These include the following:

- 1,1,1-Trichloroethane
- Cis-1,2-Dichloroethene
- Tetrachloroethene
- 1,1-Dichloroethane
- Carbon Tetrachloride
- Trichloroethene
- 1,2-Dichloroethane
- Chloroethane
- Vinyl chloride
- 1,1-Dichloroethylene

Table 3-1 provides a summary of the constituents for which the interim CEA will be established, the maximum concentration identified within the previous 24-month period, their respective NJDEP GWQS (N.J.A.C. 7:9-6), and the list of monitoring wells where the constituent has been detected above its respective standard.

Figure 2-2 provides a map showing the locations of these wells and the reported exceedances.

3.2 Interim CEA boundaries

3.2.1 Horizontal and vertical extent

The proposed horizontal interim CEA boundary incorporates the entire former Ingersoll Rand facility, which includes the area where the constituents have been found in concentrations exceeding the NJDEP GWQS and a buffer area, and the off-site property where the NJDEP GWQS for TCE was exceeded (i.e., 481 Lock Street). Since the TCE detected at the 840 South Main Street property is not related to the former Ingersoll Rand property, it is not included in this interim CEA.

The vertical extent of the interim CEA is proposed as 500 feet below ground surface (bgs). Although constituents have not been detected above the NJDEP GWQS below 300 feet bgs, a buffer area is proposed to safeguard against potential deeper wells drawing down the identified impacts in the more shallow zones. This vertical boundary can be modified at a later time if investigations confirm a shallower zone of constituent exceedances. The vertical boundary thus extends into bedrock at the site, and includes the bedrock of the Allentown Formation, which is present throughout the western portion of the site, the Rickenbach Formation, which is present throughout much of the eastern portion of the site, and the Epler Formation, which contacts the Rickenbach Formation at the southeastern portion of the site.

3.2.2 Description of proposed interim CEA

A map showing the proposed CEA, including roads, streams and other natural and manmade borders within and immediately adjacent to the proposed CEA is provided on Figure 3-1. This map is compatible with the NJDEP GIS system, as required in the NJDEP guidance. The Lot and Block numbers of each property included in the CEA is provided on Figure 3-2 and is summarized below.

Property Description	Block	Lot
Offsite Property		
481 Lock Street	3301	5
Former IR Property		
	101	1
	101	L-2
	101	L-2
	3301	1
	3301	2
	3301	4
	3301	6
	3301	4.01
	3201	7.10, 7.11, 7.12 and 7.13
	3201	7.03
	3201	7.031
	3201	7.04
	3201	7.05
Easements, Right-of-Way		
Pennsylvania Lines LLC, railroad ROW	3202	5
Conrail, Railroad ROW	3202	Lots 4 and 6

The proposed CEA falls within the following New Jersey Plane Coordinates:

Northing	Easting
308189.01	681249.22
310943.25	675688.58
303744.81	679047.97
306501.29	673482.79

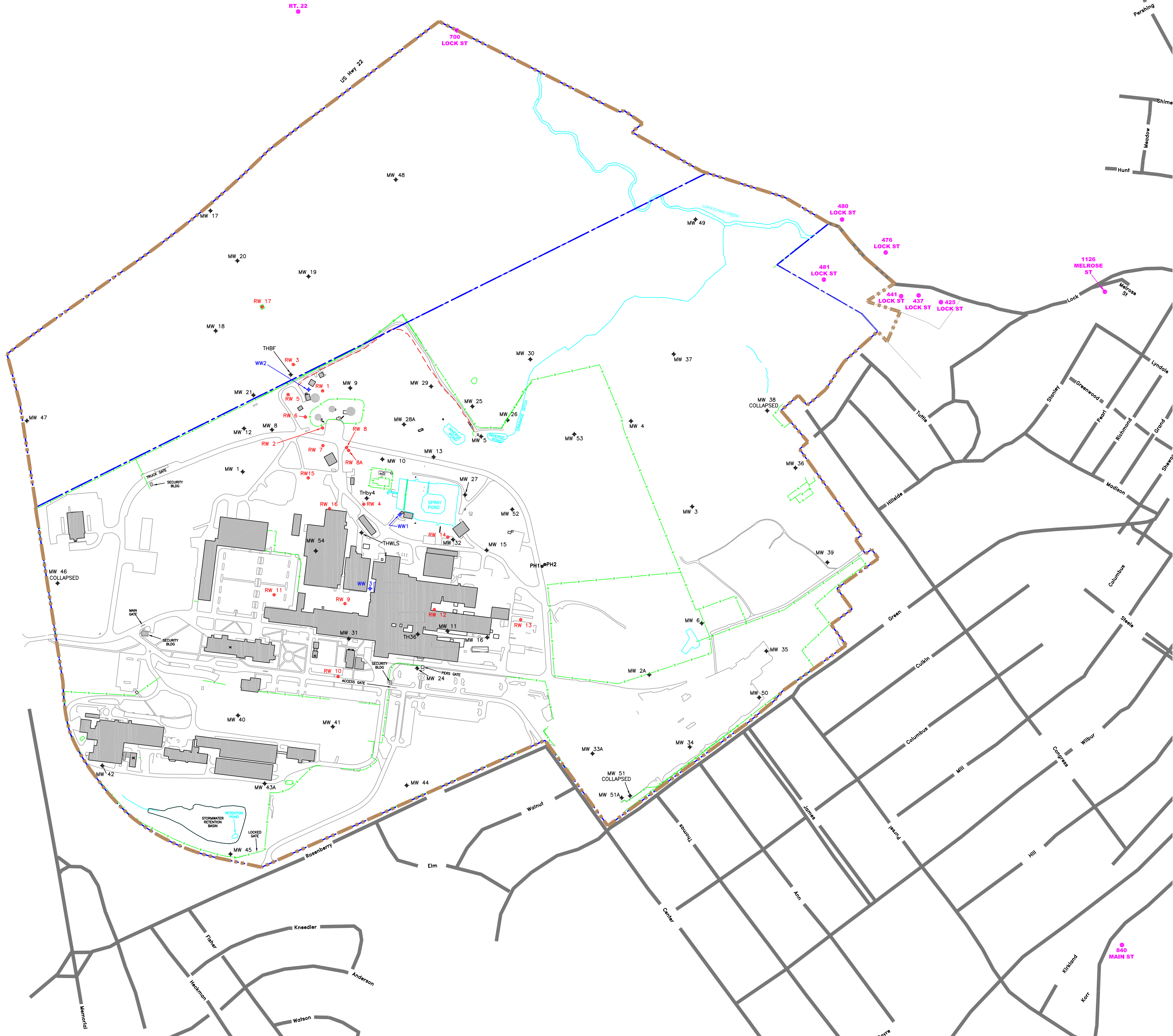
3.3 CEA duration

The proposed duration of the interim CEA is indeterminate. This site provides many challenges to evaluating and assessing the nature and extent of contamination, given the complex geology of the site, and the difficulty in determining groundwater flow, fate, and transport. Future groundwater sampling will be conducted (as described in Section 4.2 below) to continue to monitor the presence of constituents of concern above NJDEP GWQS. The results from the monitoring program will be evaluated on a continual basis, and if changes are necessary to the proposed CEA boundary, such changes will be proposed to the NJDEP in the biennial certifications (see Section 4.3, below).

**Table 3–1 Constituents of Concern Included in the CEA
Former Ingersoll Rand Facility
Phillipsburg, New Jersey**

Compound	Maximum Concentration - Location ¹ (ug/L)	GWQS to be Applied at CEA boundary (ug/L)	Monitoring Wells where GWQS exceeded
1,1,1-Trichloroethane	96.2	30	MW06, MW35, RW16, THWLS
1,1-Dichloroethane	620	50	RW16, THWLS
1,2-Dichloroethane	22.1	2	RW16
1,1-Dichloroethylene	21	2	MW06, MW16, MW32, MW35, RW, RW16, THWLS
Cis-1,2-Dichloroethene	380	70	MW04, RW09
Carbon Tetrachloride	3.4	2	MW37, RW16
Chloroethane	1260	100	RW16
Tetrachloroethene	10.6	1	MW04, MW33, MW3, MW34, MW35, RW09, RW11, RW14, RW15, RW15, TH36
Trichloroethene	23	1	MW04, MW06, MW32, MW33, MW34, MW35, MW37, RW09, RW14, RW15, RW16, THWLS, WW3, PW (481 Lock St)
Vinyl chloride	169	5	MW04, RW09, RW16, TWLS, WW3

¹ Maximum concentration locations are based on results collected between October 2005 and May 2006.



Legend

SURFACE WATER/
FEATURES AND
DRAINAGE

FORMER
INGERSOLL RAND
PROPERTY
BOUNDARY

EXISTING
FENCELINE

CEA BOUNDARY

MONITORING WELL

RECOVERY WELL

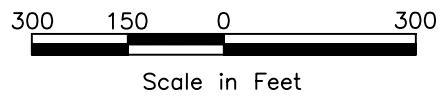
PRODUCTION WELL

OFF-SITE WELL

- NOTES:
1. MW6, MW12, MW15, MW24, RW10 AND THWLS WERE RETROFITTED

2. LOCATIONS OF BASEMAP AND STRUCTURES SHOWN ARE BASED ON SURVEYED MAP IN STATE PLANE NAD83, FEET

3. PROPERTY LINES SHOWN HEREON ARE BASED ON A DRAWING ENTITLED "SURVEY OF LANDS FOR INGERSOLL - RAND CO.," PREPARED BY STUDER & McELDOWNEY, P.A., DRAWING NO. 1590-G, DATED AUGUST 15, 2003; AND ON A DRAWING ENTITLED "SURVEY OF LANDS FOR INGERSOLL - RAND COMPANY," PREPARED BY STUDER & McELDOWNEY, P.A., DRAWING NO. 1147-G, DATED FEBRUARY 7, 1992, LAST REVISED JUNE 15, 1992.



DESIGNED BY:		NO.:	
NSO			
DRAWN BY:		DATE:	
/jk			
CHECKED BY:		DESCRIPTION:	
APPROVED BY:		REVISIONS	

ENSR | AECOM

ENSR CORPORATION
20 NEW ENGLAND AVENUE
PISCATAWAY, NEW JERSEY 08854
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INTERIM CEA BOUNDARY MAP
FORMER INGERSOLL RAND FACILITY
PHILLIPSBURG, NEW JERSEY

SCALE: AS SHOWN
DATE: 12/06
PROJECT NUMBER: 037710-173

FIGURE NUMBER:
3-1

SHEET NUMBER:
1 of 1

037710-173-010.DWG

Figure 3-2 Tax Map for Proposed CEA

[Link to Figure 3-2](#)

4.0 Implementation of the interim CEA

4.1 CEA notification requirements

Ingersoll Rand will notify the appropriate local health and municipal authorities of the towns incorporated in the CEA, and will notify the resident at 481 Lock Street of the proposed CEA and the groundwater use restrictions. All notifications will be provided to the NJDEP once conducted.

4.2 CEA monitoring

CEA monitoring will consist of the groundwater monitoring program presented in the AGWMR, in Section 6.0, for the Remedial Action Work Plan for the site. The groundwater monitoring program proposed consists of the sampling of 44 wells (i.e., monitoring wells, LNAPL recovery wells, and former production wells) and 4 sentinel wells (i.e., total of 48 wells) for VOCs by USEPA Method. Upon NJDEP approval, groundwater monitoring will occur on an annual basis for the next six-years, and then bi-annually thereafter. Groundwater gauging activities will be conducted prior to sampling events and will no longer continue on a quarterly basis.

4.3 CEA certifications

Based on N.J.A.C. 7:26E-8.4 and 8.6, a certification must be submitted to NJDEP biannually on the anniversary of NJDEP acceptance of an institutional or engineering control such as a groundwater CEA. As part of the biennial certification requirements (N.J.A.C. 7:26E8.6a-7.ii), Ingersoll Rand proposes that groundwater gauging and analytical data collected during the proposed groundwater monitoring program discussed above (Section 4.2) be evaluated to verify the extent of the proposed CEA. Any proposed changes to the CEA extent will be detailed in the required Biennial Certification Monitoring Report.

5.0 References

Environmental Data Resources, 2006, EDR Radius Atlas plus Geotrack for 425 Pursel Street in Phillipsburg, NJ. June 16, 2006. EDR: Milford, Connecticut.

ENSR, 2004. Site History Report, October 2004. ENSR International: Piscataway, New Jersey.

ENSR, 2006. Annual Groundwater Monitoring Report (AGWMR), November 2006. ENSR International: Piscataway, New Jersey.

NJDEP, 1994 Administrative Consent Order in the Matter of the Ingersoll Rand site and Ingersoll Rand Respondent, amended August 12, 2004. New Jersey Department of Environmental Protection: Trenton, New Jersey.

NJDEP, 1998, GIS Resource Data – CD ROM. New Jersey Department of Environmental Protection: Trenton, New Jersey

Attachment 1

Classification Exception Area Fact Sheet

Prepared for:
Ingersoll Rand Company
Montvale, New Jersey

Attachment 1

Classification Exemption Area Fact Sheet for the Former Ingersoll Rand Facility in Phillipsburg, New Jersey

ENSR Corporation
January 2007
Document No.: 03710-173-CEAFS

Contents

A. Site Information	1
B. Proposed Classification Exemption Area Information	1

A. Site Information

1. **Program's Site Identification Number:** 99685 / 2000050 / 2004306
2. **Program Interest Number (Preferred ID):** NJD002395382
3. **Program Interest Name:** Former Ingersoll Rand Site
4. **Street Address:** 942 Memorial Parkway
5. **City:** Phillipsburg
6. **County:** Warren County
7. **Block and lots of the site:**
 - a. **Name of municipality in which the site is located:** Town of Phillipsburg and Lopatcong Township
 - b. **Block and Lot:** (also see attached map, which is also Figure 3-2 of the CEA report)

Property Description	Block	Lot
Offsite Property		
481 Lock Street	3301	5
Former IR Property		
	101	1
	101	L-2
	101	L-2
	3301	1
	3301	2
	3301	4
	3301	6
	3301	4.01
	3201	7.10, 7.11, 7.12 and 7.13
	3201	7.03
	3201	7.031
	3201	7.04
	3201	7.05
Easements, Right-of-Way		
Pennsylvania Lines LLC, railroad ROW	3202	5
Conrail, Railroad ROW	3202	Lots 4 and 6

c. Year of tax maps: 2006

8. **United State Geological Survey Quadrangle map, including location of the site, presented as Exhibit A** (this figure is also Figure 1-1 of the CEA report).

9. Site Contact:

- a. **Name of contact person:** Aaron Kleinbaum, Assistant General Counsel and Director of Environment Safety and Health
- b. **Company name:** Ingersoll Rand Company
- c. **Mailing address:** 155 Chestnut Ridge Road, Montvale , New Jersey 07645
- d. **Phone number:** (201) 573-3233

B. Proposed Classification Exemption Area Information

1. Narrative Description of proposed classification exemption area:

The proposed horizontal interim CEA boundary incorporates the entire former Ingersoll Rand facility, which incorporates the area where the constituents have been found in concentrations exceeding the NJDEP GWQS and a buffer area, and the off-site property where the NJDEP GWQS for TCE was exceeded (i.e., 481 Lock Street).

The vertical extent of the interim CEA is proposed as 500 feet below ground surface (bgs). Although constituents have not been detected above the NJDEP GWQS below 300 feet bgs, a buffer area is proposed to safeguard against potential deeper wells drawing down the identified impacts in the more shallow zones. This vertical boundary can be modified at a later time if investigations confirm a shallower zone of constituent exceedances. The vertical boundary thus extends into bedrock at the site, and includes the bedrock of the Allentown Formation, which is present throughout the western portion of the site, the Rickenbach Formation, which is present throughout much of the eastern portion of the site, and the Epler Formation, which contacts the Rickenbach Formation at the southeastern portion of the site.

2. Location of proposed classification exemption area (duplicate if the site is located in more than one municipality):

a. **Name of municipality in which the site is located:** Town of Phillipsburg and Lopatcong Township

b. **Block and Lot:** (see attached map, which is also Figure 3-2 of the CEA report)

Property Description	Block	Lot
Offsite Property		
481 Lock Street	3301	5
Former IR Property		
	101	1
	101	L-2
	101	L-2
	3301	1
	3301	2
	3301	4
	3301	6
	3301	4.01
	3201	7.10, 7.11, 7.12 and 7.13
	3201	7.03
	3201	7.031
	3201	7.04
	3201	7.05
Easements, Right-of-Way		
Pennsylvania Lines LLC, railroad ROW	3202	5
Conrail, Railroad ROW	3202	Lots 4 and 6

c. **Year of tax maps:** 2006

3. Affected Aquifer(s):

<u>Aquifer Name</u>	<u>Vertical Depth</u>	<u>Groundwater Classification</u>
Bedrock Aquifer	500 feet	Class IIA

4. Contaminant Concentrations: Constituents of concern for the site, and for which the interim CEA will be established, include those constituents reported in groundwater at concentrations in excess of NJDEP GWQS. These include the following:

- 1,1,1-Trichloroethane
- 1,1-Dichloroethane
- 1,2-Dichloroethane
- 1,1-Dichloroethylene
- Cis-1,2-Dichloroethene
- Carbon Tetrachloride
- Chloroethane
- Tetrachloroethene
- Trichloroethene
- Vinyl chloride

The attached table (which is also Table 3-1 of the CEA) provides a summary of the constituents for which the interim CEA will be established, the maximum concentration identified within the previous 24-month period, their respective NJDEP GWQS (N.J.A.C. 7:9-6), and the list of monitoring wells where the constituent has been detected above its respective standard.

5. Proposed classification exemption area boundaries:

Horizontal: Scaled map indicating projected areal extent of proposed classification exemption area, as well as location of site, presented as Exhibit B (refer to Exhibit B, which is also provided as Figure 3-1 of the CEA report).

Vertical: As stated in B.3, above.

Locational coordinates of boundary of proposed classification exemption area as New Jersey Plane Coordinates: A minimum of four coordinates are provided below, and are provided in a format compatible with the Department's geographic information system:

Northing	Easting (New Jersey State Plane Coordinates)
308189.01	681249.22
310943.25	675688.58
303744.81	679047.97
306501.29	673482.79

6. Estimated size of the proposed groundwater classification exemption area: 400 acres

7. Project duration and expiration date of the proposed classification exemption area:

- a. **Duration (in years of days):** Indeterminate
- b. **Expiration date (as calendar date):** Indeterminate

Tables

**Table 1 Constituents of Concern Included in the CEA
Former Ingersoll Rand Facility
Phillipsburg, New Jersey**

Compound	Maximum Concentration - Location ¹ (ug/L)	GWQS to be Applied at CEA boundary (ug/L)	Monitoring Wells where GWQS exceeded
1,1,1-Trichloroethane	96.2	30	MW06, MW35, RW16, THWLS
1,1-Dichloroethane	620	50	RW16, THWLS
1,2-Dichloroethane	22.1	2	RW16
1,1-Dichloroethylene	21	2	MW06, MW16, MW32, MW35, RW, RW16, THWLS
Cis-1,2-Dichloroethene	380	70	MW04, RW09
Carbon Tetrachloride	3.4	2	MW37, RW16
Chloroethane	1260	100	RW16
Tetrachloroethene	10.6	1	MW04, MW33, MW3, MW34, MW35, RW09, RW11, RW14, RW15, RW15, TH36
Trichloroethene	23	1	MW04, MW06, MW32, MW33, MW34, MW35, MW37, RW09, RW14, RW15, RW16, THWLS, WW3, PW (481 Lock St)
Vinyl chloride	169	5	MW04, RW09, RW16, TWLS, WW3

¹ Maximum concentration locations are based on results collected between October 2005 and May 2006.

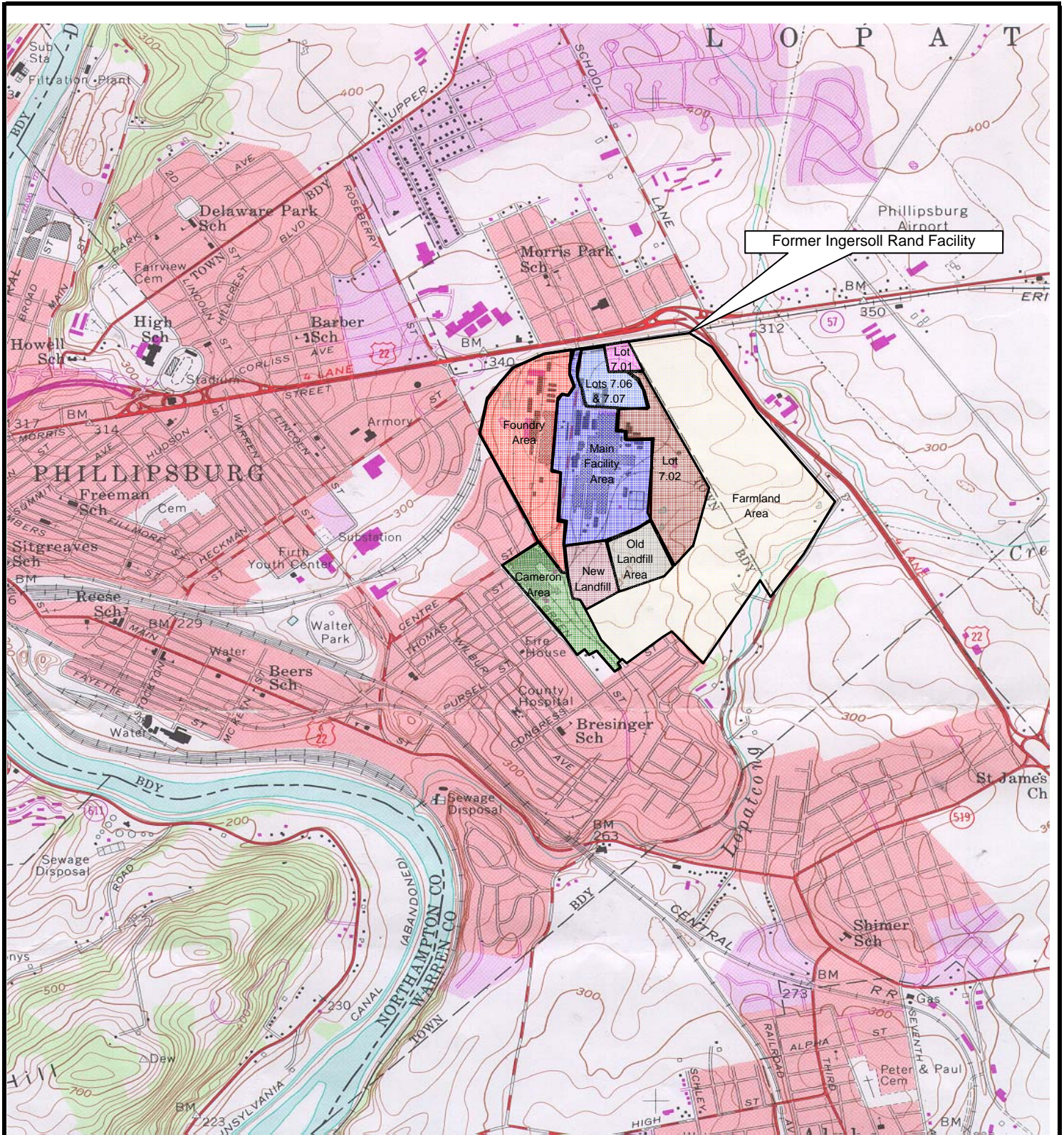
Figures

Figure 3-2 Tax Map for Proposed CEA

[Link to Figure 3-2](#)

Exhibit A

Figure 1-1 from CEA, Site Location Map



Scale: 1:24,000

Ingersoll Rand Company

Groundwater-Annual Monitoring Report
USGS 7.5' Topographic
Quadrangle - Easton, PA-NJ, 1954 (Photorevised 1981)

Former Ingersoll Rand Facility

942 Memorial Parkway
Phillipsburg, New Jersey

November 2006

Job No. 03710-173

Figure 1: Site
Location Map

ENSR | AECOM

Exhibit B

Figure 2-1 from CEA, Proposed CEA

Appendix M

Quality Assurance Project Plan

Quality Assurance Project Plan

Soil and Groundwater Remedial Investigation
Former Ingersoll Rand Company Facility in Phillipsburg, NJ

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Revision: 3

Date: May 2006

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Quality Assurance Project Plan

Soil and Groundwater Remedial Investigation
Former Ingersoll Rand Company Facility in Phillipsburg, NJ

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Quality Assurance Project Plan

Soil and Groundwater Remedial Investigation
Former Ingersoll Rand Company Facility in Phillipsburg, NJ

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Soil and Groundwater Remedial Investigation
Former Ingersoll Rand Company Facility in Phillipsburg, NJ

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Soil and Groundwater Remedial Investigation
Former Ingersoll Rand Company Facility in Phillipsburg, NJ

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Soil and Groundwater Remedial Investigation
Former Ingersoll Rand Company Facility in Phillipsburg, NJ

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Quality Assurance Project Plan

Soil and Groundwater Remedial Investigation
Former Ingersoll Rand Company Facility in Phillipsburg, NJ

Section: 1-1

Revision: 3

Date: May 2006

1.0 Introduction

This Quality Assurance Project Plan (QAPP) has been prepared by ENSR Corporation (ENSR) to address the planned soil and groundwater investigation and remedial activities for the former Ingersoll Rand Company (Ingersoll Rand) facility located in Phillipsburg, New Jersey and to assure the quality of these activities. The planned investigation and remedial activities are detailed in the following documents:

- February 2006 Old Landfill Remedial Action Workplan (RAW);
- January 2006 Annual Groundwater Monitoring Report and Remedial Investigation Workplan (RIWP);
- January 2006 Farm Site Investigation/Remedial Investigation Report (SI/RI) & Remedial Action Workplan (RAW);
- September 2005 Main Facility Area SI/RI/RAW;
- August 2005 Petition for Variance – Delineation of impacts Related to Foundry Sand-Derived Fill;
- August 2005 Foundry Area SI/RI/RAW;
- June 2005 Lot 7.06/7.07 SI/RI/RAW;
- May 2005 Cameron Area SI/RI/RAW;
- November 2004 Site History Report;
- November 2004 Soil Remedial Investigation Report;
- January 2005 Annual Groundwater Monitoring Report and Supplemental Groundwater RIWP;
- August 2005 Groundwater RIWP;
- July 2004 Farm and Undeveloped Parcels Preliminary Assessment Report;
- February 2002 Groundwater RIWP; and
- ENSR internal workplans.

This document is intended to be a work-in-progress and will be modified as necessary during the performance of activities. This QAPP was prepared in accordance with the March 14, 1994 Administrative Consent Order (ACO) between the State of New Jersey and Ingersoll Rand, and the New Jersey Department of Environmental Protection (NJDEP) Technical Requirements for Site Remediation (N.J.A.C. 7:26E-2.2 et. seq.).

1.1 Project description

ENSR has been retained by Ingersoll Rand to conduct various soil and groundwater investigations and remediation at the former Ingersoll Rand property located in Phillipsburg, New Jersey. The activities anticipated to be conducted in 2006 are summarized as follows:

Soil investigative and remedial activities:

Quality Assurance Project Plan

Soil and Groundwater Remedial Investigation
Former Ingersoll Rand Company Facility in Phillipsburg, NJ

Section: 1-2

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Date: May 2006

- Prepare a remedial action report (RAR) and deed notice for soil remedial activities conducted within the Lot 7.07 Area;
- Conduct soil borings to physically characterize and delineate potential foundry sand-derived fill beyond the property boundary and prepare a letter report describing the results;
- Conduct remedial activities in the former Cameron Area of the site and prepare a RAR and deed notice for soil impacts remaining in this location;
- Conduct remedial activities at the Old Landfill and prepare a RAR and deed notice for soil impacts remaining at that location;
- Conduct remedial activities at the Spray Pond; and
- Conduct additional vapor intrusion investigations in the Main Facility Area and prepare a Vapor Intrusion Evaluation Report.

Groundwater activities:

- Conduct interim remedial activities related to the area of Light Non-Aqueous Phase Liquids (LNAPL) impact including the operation and maintenance of a groundwater and LNAPL recovery system;
- Conduct quarterly product thickness and water level gauging of all site wells;
- Conduct semiannual groundwater sampling of select monitor and recovery wells;
- Conduct upgrades and retrofit activities at three site monitoring wells;
- Conduct additional investigation at former potable well locations WW2 and WW3;
- Conduct geophysical survey of select monitoring and/or recovery wells,
- Install a deep monitoring well per the 2005 *Groundwater Remedial Investigation Work Plan*;
- Conduct investigations related to potential offsite migration of groundwater impacts;
- Prepare an analysis data to aid in remedial alternative analysis and preparation of a Classification Exception Area;
- Preparation and submission of Annual Groundwater Report and Supplemental Remedial Investigation Report.

Permit compliance:

- Manage Ingersoll Rand's responsibilities related to the ACO and the various operating permits required to perform the proposed remedial activities.

Other activities:

- Development and maintenance of an integrated database of soil, groundwater, and geologic data to support the above activities.

Please note that activities may be added or eliminated during the year based on owner requested acceleration, requests for activities, or delays in NJDEP approval of submitted workplans.

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1.2 Site description

The former Ingersoll Rand site is located at 942 Memorial Parkway in Phillipsburg, New Jersey and occupies approximately 385 acres within the Town of Phillipsburg and Lopatcong Township. The facility consists of multiple buildings, foundations of former buildings, roads and parking areas, two landfills, several ponds, landscaped areas, and agricultural fields. The site is shown on the USGS 7.5-minute Topographic Quadrangle Map for Easton, PA-NJ which is included as Figure 1. Additionally, a current site map is provided as Figure 2.

Ingersoll Rand began facility construction in 1903 with various expansions and additions throughout the following 70 years. Since 1973 operations have been declining. Based on previous reports, the facility has produced products such as pumps and turbo equipment, air and gas compressors, and rock drill and mining equipment. The facility also maintained an active iron and steel foundry onsite, which was operated to process the raw materials for Ingersoll Rand's manufacturing operations. Subsequent restructuring activities resulted in closing or moving of almost all of these operations. The site was sold to Phillipsburg Associates, L.P. I, II, and III (c/o Preferred Real Estate Investments, Inc.: PREI) in late 2004 and is in the process of being redeveloped as a mixed use commercial and light industrial business park. Current operations at the site, now Phillipsburg Commerce Park, include pump R&D and manufacturing by Curtiss Wright and Flow Serve; structural steel fabrication by Stateline Fabricators, Inc; and School Bus operations by Village Bus Company.

A detailed history along with historic site plans was provided in the November 2004 *Site History Report*.

Land use adjacent to the facility includes residential, commercial, and agricultural properties.

1.3 Project history and regulatory background

Environmental investigation at the former Ingersoll Rand Phillipsburg facility began in the 1970s.

During the installation of a production well in 1974, the presence of LNAPL was discovered, and Ingersoll Rand began investigation and remedial activities to mitigate the LNAPL impact. Through the 1970s and 1980s, Ingersoll Rand installed a network of monitoring and recovery wells and installed a groundwater and LNAPL recovery system in 1986. In 1992 Ingersoll Rand began conducting activities to identify potential Areas of Concern (AOCs) at the former Ingersoll Rand Phillipsburg facility, specifically areas which had the potential to contribute to LNAPL impact. These activities included a review of site historical documents and aerial photos, interviews with site personnel, and physical inspections of portions of the site followed by investigative soil sampling and analysis. These investigations led to the discovery of 32 soil AOCs and four groundwater AOCs, which were detailed in the 1994 *Draft Remedial Investigation Workplan (RIWP)*. The historical review activities were not individually documented but were used in support of the 1994 *Draft RIWP* approved by NJDEP. Subsequent to these initial investigations presented in the 1994 *Draft RIWP*, Ingersoll Rand continued to conduct investigative and remedial activities, and an additional 9 AOCs were discovered. NJDEP approval of No Further Action or conditional No Further Action was obtained for 25 AOCs.

In 2003 Ingersoll Rand decided to accelerate soil investigative activities in anticipation of future redevelopment activities. In October 2003, Ingersoll Rand and ENSR presented a conceptual remedial investigation work plan to NJDEP. Soil investigative activities would be conducted simultaneously at all remaining site AOCs with the goal of large-scale delineation of impacts without detailed sampling scopes created for each AOC. Final delineation would define the boundaries of a Deed Notice which would be prepared for submission in a later

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Remedial Action Work Plan. NJDEP verbally approved Ingersoll Rand's concept and ENSR began an accelerated soil investigation in October 2003. As a result of these investigations, a Soil Site Investigation/Remedial Investigation Report (SI/RIR) was submitted to NJDEP in July 2004.

On August 27, 2004, the former facility was purchased by PREI. A modified preliminary assessment report, Site History Report, was submitted to NJDEP in October 2004, which identified an additional 15 potential AOCs related to soil. In 2005, ENSR completed soil investigation activities across most of the site in an effort to complete soil delineation. Furthermore, ENSR submitted Site/Remedial Investigation Reports and Remedial Action Workplans (SI/RIR/RAWs) for much of the former facility for approval by NJDEP. Additionally, ENSR began preparations to conduct remedial actions at the Spray Pond, Inverse Ponds, and Old Landfill.

Soil impacts identified at the former Ingersoll Rand Phillipsburg facility are composed of primarily petroleum hydrocarbons, metals, and polycyclic aromatic hydrocarbons. Groundwater impacts consist mainly of LNAPL and chlorinated volatile organic compounds. An initial Indoor Air Quality Survey was conducted in the Main Facility Area in 2005; additional vapor intrusion monitoring is proposed to continue in 2006.

1.4 Project objectives

The objectives of the work proposed in CY 2006 are to assist Ingersoll Rand in managing their environmental obligations at the former Phillipsburg facility with respect to the ACO with NJDEP, to the Purchase and Sale Agreement with PREI, and the various operating permits which are currently held by Ingersoll Rand.

More specific objectives are to cost effectively and safely complete remedial activities at the site, obtain NJDEP concurrence that no further action is required for soils, obtain NJDEP approval of monitored natural attenuation as the remedy for groundwater, and completely turn the site over to PREI for development. In CY 2006, ENSR has proposed activities to complete all remedial activities for soil within the Cameron Area, the Old Landfill, Lot 7.07, and the Spray Pond; to continue investigative and interim remedial activities related to LNAPL and chlorinated volatile organic compound impacts to groundwater; to continue vapor intrusion investigation in the Main Facility Area (if the draft guidance document is promulgated); and to manage Ingersoll Rand's responsibilities related to the ACO and the various operating permits required to continue remedial activities. Details of the planned activities are described in Proposal for Professional Environmental Services for Calendar Year 2006 to Conduct Soil and Groundwater Remedial Activities at the Former Ingersoll Rand Facility, Phillipsburg, NJ dated December 5, 2005 (ENSR Proposal 03710-C26). Based on the delayed NJDEP response to submitted reports, as well as requests made by the property owner, the specific scope of work may be modified through the course of activities to meet specific Ingersoll Rand objectives.

1.5 Target parameters and methods

Based on a review of historic soil and groundwater data, the target parameters for the proposed remedial investigative activities are listed in Table 1 "Analytical Methods/Quality Assurance Summary Table". These parameters include:

- Total petroleum Hydrocarbons (TPHC);
- Priority Pollutant Compounds (PP+40);
- Volatile organic compounds with a library search of the 10 largest unidentified peaks (VOC+10);

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- Base-neutral organic compounds with a library search of the 15 largest unidentified peaks (BN+15);
- Polychlorinated Biphenyls (PCBs);
- Pesticides;
- Priority Pollutant Metals; and
- Mercury.

Table 1 indicates the method and quality standards associated with each parameter.

1.6 Data quality objectives

Data Quality Objectives (DQO) are qualitative and quantitative statements which specify the quality of the data required to support decisions made during the investigative activities and are based on the end uses of the data to be collected. As such, different data uses may require different levels of data quality. There are five analytical levels that address various data uses and the quality assurance/quality control (QA/QC) effort and methods required to achieve the desired level of quality. These levels are described below:

Screening (DQO Level 1): This provides the lowest data quality but the most rapid results. It is often used for health and safety monitoring at the site, preliminary comparison to applicable or relevant and appropriate requirements (ARARs), initial site characterization to locate areas for subsequent and more accurate analyses, and for engineering screening and alternatives (bench-scale tests).

Field Analyses (DQO Level 2): This provides rapid results and better quality than DQO Level 1 does. This level may include mobile laboratory generated data depending on the level of QC exercised.

Engineering (DQO Level 3): This provides an intermediate level of data quality and is used for site characterization, environmental monitoring, and engineering studies. This level includes laboratory analysis using standard EPA-approved methods other than the Contract Laboratory Program (CLP).

Conformational (DQO Level 4): This provides the highest level of data quality and is used for purposes of risk assessment and potentially responsible party (PRP) determination. These analyses require CLP analytical procedures and full data validation in accordance with EPA recognized protocol.

Non-Standard (DQO Level 5): This refers to analyses by non-standard protocols, such as when exacting detection limits or analysis of an unusual chemical compound is required. These analyses often require method development and adaptation. The level of QC is usually similar to DQO Level 4 data.

The types of data generated during this investigation are expected to be Level 1, Level 2, and Level 3. Field measurements collected from photo ionization detectors (PID) will be considered Level 1 data. Water quality measurements will also be considered Level 1 data, as well as the data generated as part of the geophysical investigation.

A field gas chromatograph (GC) may be used as part of the semi-annual sampling effort as a field analytical instrument. Analytical results from the Field GC will be considered Level 2 data.

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All analytical results received for samples submitted to a NJDEP-certified laboratory will be considered Level 3 Data provided the data meet QA/QC requirements.

It is expected that DQOs greater than Level 3 will not be warranted during the planned remedial investigation.

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2.0 Project organization and responsibility

2.1 Project organization

A Project Management Team has been established that consists of four individuals—the Principal-in-Charge (PIC), the Project Manager, the Assistant Project Manager, and the Piscataway Operations Manager. Management responsibilities are described in Section 2.2.

ENSR Standard Operating Procedures (SOPs) are referred to in this QAPP. These SOPs are filed in the Piscataway office and stored in the following Piscataway office directory:
\\03dcpiscataway\piscataway\Project\Ingersoll Rand\03710-173\SOPs\.

Forms are located in Appendix A of this QAPP and in electronic form in the Piscataway office directory:
\\03dcpiscataway\piscataway\Project\Ingersoll Rand\03710-173\Quality Assurance\QAPP \Templates\Forms\.

2.2 Management responsibilities

The roles and responsibilities of the key personnel that will participate in the remedial investigation are summarized below. A detailed review of quality assurance tasks and responsibilities is provided in Section 2.2.1.

Principal-In-Charge: William Duvel, ENSR, 2 Technology Park Drive, Westford, Massachusetts, 01886, phone: (978) 589-3000, e-mail: wduvel@ensr.aecom.com. Mr. Duvel will serve as Principal-in-Charge and will interface with Ingersoll Rand and will act as senior reviewer for technical reports and correspondence.

Project Manager: Gregg Micalizio, ENSR, 20 New England Avenue, Piscataway, New Jersey 08854, phone (732) 981-0200, e-mail: gmicalizio@ensr.aecom.com. Mr. Micalizio will be responsible for daily coordination of the project, management of the project team, and the overall success of the project. The Project Manager will review reports and all correspondence prior to submission and will act as overall technical coordinator. Mr. Micalizio will also interface with Ingersoll Rand, PREI, and other stakeholders as necessary; will maintain budget and schedule; track invoices, PO's, subcontracts; and set project goals and objectives according to proposal and client-authorized changes as they arise.

Assistant Project Manager: Nadia Oliveira, ENSR, 20 New England Avenue, Piscataway, New Jersey 08854, phone (732) 981-0200, e-mail: noliveira@ensr.aecom.com. Ms. Oliveira will be responsible for assisting the Project Manager in daily coordination and management of the project team; interfacing with Task Managers to ensure tasks are understood and being completed on time and on budget; will attend project meetings including those with client, NJDEP, and/or PREI as necessary. Additionally, APM will be responsible for the preparation of quarterly progress reports and assist in monthly internal meetings.

Database and GIS Manager: Andrea LoCashio, ENSR, 20 New England Avenue, Piscataway, New Jersey 08854, phone (732) 981-0200, e-mail: alocashio@ensr.aecom.com. Ms. LoCashio will be responsible for the development and management of the groundwater, soil, and geologic databases and will assist Task Managers with analysis and presentation of the data.

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Quality Assurance Manager (QAM): Mary Beaton, ENSR, 20 New England Avenue, Piscataway, New Jersey 08854, phone (732) 981-0200, e-mail: mbeaton@ensr.aecom.com. Ms. Beaton will be responsible for maintaining compliance with ENSR's internal and project specific standards and practices for Quality Assurance. Ms. Beaton will maintain and implement the QAPP.

Engineering Manager: Steven Surman, ENSR, 20 New England Avenue, Piscataway, New Jersey 08854, phone (732) 981-0200, e-mail: ssurman@ensr.aecom.com. Mr. Surman will manage and delegate tasks related to capping of the Old Landfill (if awarded), closure of the Inverse Ponds, soil reuse/disposal activities, and removal of sediment from the Spray Pond, as well as other engineering-based tasks.

On-Site Representative and Site Health & Safety Coordinator: Tony Kwiec, ENSR, 222 Cameron Drive, Phillipsburg, New Jersey 08865, phone (908) 864-5149, e-mail: tkwiec@ensr.aecom.com. Mr. Kwiec will be responsible for documenting developer's compliance with the purchase and sale agreement; maintaining the site office; will provide support for investigation and remediation including landfill capping (if approved), soil reuse, spray pond sediment removal, and inverse pond removal; permit and compliance activities including landfill permit, NJPDES, water allocation, and SESCO; and groundwater system O&M. Mr. Kwiec will also be in charge of coordinating health and safety issues on site and maintaining health and safety documentation.

Task Managers: Task managers for soil and groundwater investigation and remedial activities will include the following ENSR personnel.

- Roya Kambin: rkambin@ensr.aecom.com – groundwater investigation and remediation;
- Steven Kostage, ENSR, 2 Technology Park Drive, Westford, Massachusetts, 01886, phone: (978) 589-3000, skostage@ensr.aecom.com – remedial activities;

Task Managers will manage and implement investigative and remedial activities as approved by Ingersoll Rand, NJDEP, and ENSR PM. TMs will be responsible for coordinating field staff, maintaining budget and schedule, as well as the development of detailed internal workplans and schedules.

Ingersoll Rand corporate contacts:

Dawn Horst, Project Environmental Scientist, Environmental Engineering, Ingersoll Rand Company, 155 Chestnut Ridge Road, Montvale, NJ 07645, Phone: (201) 573-3031, e-mail: Dawn_Horst@irco.com.

Aaron Kleinbaum, Assistant General Counsel and Director of Environmental, Safety & Health, Ingersoll Rand Company, 155 Chestnut Ridge Road, Montvale, New Jersey 07645, Phone: (201) 573-3233, e-mail: Aaron_Kleinbaum@irco.com.

Laboratory contacts:

David Lissy, Project Manager, STL-Edison, 777 New Durham Road, Edison, New Jersey 08817, Phone: (732) 549-3900, e-mail: dlissy@stl-inc.com, NJDEP Certification No.: 12028.

Marty Vitanza, Client Service Representative, Accutest Laboratories, 2235 Route 130, Dayton, NJ 08810, Phone: (732) 329-0200, Fax: (732) 329-3499, e-mail: martyv@accutest.com, NJDEP Certification No.: 12129.

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2.2.1 Quality Assurance responsibilities

2.2.1.1 Quality Assurance Manager

The QAM, under the direction of the Assistant Project Manager, will act as the Quality Assurance Manager for continuing activities at the former Ingersoll Rand Phillipsburg facility and will be responsible for overall quality assurance oversight. The duties of the QA Officer will include overseeing implementation of QAPP requirements and ensuring that any required internal performance and system audits are conducted.

The QAM will perform the following QA tasks:

- Revise QAPP. When necessary, the QAM will revise the QAPP as per protocol in Section 15.
- Monitor program activities to determine whether ENSR and Project Quality Program SOPs are being met.
- Ensure that corrective actions are implemented and appropriate, when necessary.
- Maintain log of field performance audits. The QAM will collect reports by Field TMs and if necessary interview Field TMs weekly to determine the quality of performance of field staff.
- Monitor Database Audits. The QAM will discuss the scheduling and results of database audits with the Database & GIS Manager. An Audit Template is included in Appendix A.
- Conduct meetings regarding QA procedures. When necessary, the QAM will meet with TMs and field staff to review QA procedures and practices.
- Perform Program Audits every 2 months.
- Participate in Report Preparation Kick Off meetings

The QAM will report to the Quality Management Steering Committee, which will oversee changes in quality assurance procedures. The members of the Quality Management Steering Committee Team meet quarterly to review quality assurance audit results. In addition, the Team approves the appointment of the individuals assigned to each position on the Team.

2.2.1.2 Task Managers and Field Personnel

Task Managers will be responsible for the following specific QA tasks:

- Monitoring Field Books and Field Documentation. Ensuring that field books, chains of custody (COCs), and other field documentation are complete and correspond with the scope of work. Task Managers for continuing investigation and remedial activities at the former Ingersoll Rand Phillipsburg facility will be responsible for locating sample locations (i.e., wells), ensuring adequate sample containers are available for sampling personnel, making sure that the required samples are collected and proper sampling techniques are used, ensuring that the appropriate documentation is completed, and the samples are properly preserved, packaged, and shipped to the appropriate laboratories. Task Managers will receive copies of field notes and documentation from Field Team members and will review these notes on a daily basis. Deficiencies in the field notes will be reported by the Task Managers to the QAM and the authors of the field notes in question. Field notebook authors will revise the field notes as appropriate.

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- Performing a limited validation of analytical data packages prior to delivering data package to the Database Manager.
- Performing field audits periodically as agreed upon with the QAM.

Task Managers and the On-Site Representative will also be responsible for subcontractor management while ENSR subcontractor personnel are onsite and ensuring that tailgate health and safety briefings are conducted for compliance with the [Health and Safety Plan \(HASP\)](#).

The Field Team members' responsibilities will include collecting samples, conducting field measurements, and documentation of all activities pursuant to the [Operations Manual](#), the QAPP, ENSR standard operation procedure, and applicable NJDEP regulation and guidance. Field Team members will submit a copy of field documentation to the appropriate Task Manager, and will revise notes as necessary based on the Task Manager's quality assurance review.

2.2.1.3 Database Manager

The Database Manager will be responsible for the following QA tasks:

- Overseeing the quality control tasks to ensure that hard copy reports of analytical data correspond with data imported into the database.
- Overseeing the quality control tasks to ensure that the reporting of data is accurate and complete.

2.2.2 Subcontracts

All subcontracts are to be competitively bid and the evaluation procedure documented on a subcontractor evaluation form (Appendix A). This form is to be attached as an internal document on all purchase requisitions. Each subcontractor is responsible for meeting project specific insurance requirements, providing documentation of personnel OSHA compliance, and performing activities as per the specific scope of work detailed in each subcontract purchase order. Subcontractors are additionally responsible for following industry standard and/or state mandated procedures for completing all field activities. Deliverables, if required pursuant to the scope of work, are to be provided within two weeks of the completion of field activities, unless otherwise negotiated.

2.2.3 Personnel training

All ENSR and subcontractor personnel working on the former Ingersoll Rand Phillipsburg facility project will be properly trained and qualified individuals. Prior to the commencement of work on the site, personnel will be given instructions specific to this project, covering the following areas.

- Health and safety considerations.
- Organization and lines of communication and authority,
- Overview of the field investigation activities,
- QA/QC considerations,
- Documentation requirements, and

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- Decontamination requirements.

Training of field personnel will be provided by the ENSR Project Manager, ENSR Task Managers, QAM, and/or any other qualified designee.

Training provisions are detailed in the DRAFT Training Plan dated November 11, 2005. Environmental Compliance related training is described in the [revised April 2006 ECAP](#).

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3.0 Geophysical investigation

3.1 Applicable standards of geophysical investigation

ENSR will conduct the geophysical investigation according to applicable equipment manufacturer's recommendations, [ENSR SOPs](#), and ASTM standards. The geophysical subcontractor will be responsible for conducting this investigation as per these standards.

3.2 Overview of geophysical investigation procedures

Continuing investigative activities include geophysical and hydrogeologic investigations to be conducted at various site wells. Proposed geophysical logging procedures will include: optical televiewer (OPTV) recording, caliper logging, salt-slug conductivity testing, packer testing, and pump testing.

A detailed methodology is provided in the [ENSR SOPs](#). Where possible, hardcopy logs for each of the logs will be produced in the field for record-keeping, reporting, and comparison with final logs completed after data import and analysis.

3.3 Decontamination procedures

Decontamination of the probe will be conducted before initial use and in between locations. ENSR will be responsible for assuring that decontamination is conducted throughout the geophysical investigation.

Decontamination will consist of a three-step process. First, equipment will be scrubbed with a solution of Liquinox (or equivalent laboratory grade cleanser) and distilled or tap water. Following the initial scrub, the equipment will be rinsed in water and scrubbed to remove any remaining contamination. Lastly, a final water rinse using distilled/deionized water will be employed to remove any residual contamination.

3.4 Quality control

The geophysical investigation subcontractor and the appropriate Task Manager will be responsible for ensuring QC during this phase of the project. The geophysical investigation subcontractor will be responsible for conducting the geophysical investigation including supplying all necessary equipment and personnel, using the previously described equipment as per the SOPs, and providing ENSR with the data collected from the investigation. ENSR will provide an on-site geologist to assist with verification of investigation, adherence to the assigned scope of work, and to provide appropriate field documentation.

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4.0 Soil investigation

4.1 Soil sampling

To ensure that each sample collected is representative of the conditions at that location, and that the sample is neither altered nor contaminated by the sampling and handling procedures, ENSR will conduct all sampling as per the August 2005 [NJDEP Field Sampling Procedures Manual \(FSPM\)](#) and [NJDEP Technical Requirements for Site Remediation](#), and applicable [ENSR SOPs](#).

In order to insure the integrity of all soil samples, all samples will be handled in a manner consistent with the sample container, preservation, and holding time requirements specific to the analysis requirements of this investigation.

Field instruments that will be implemented in the soil remedial investigation will include photoionization detectors (PID-MiniRAE, PID-ppbRAE or equivalent with a 10.6 eV lamp) and/or a Field GC (PhotoVac Voyager or equivalent). All field measurement equipment will be maintained to ensure that measurements obtained are accurate and defensible. Procedures for maintaining the accuracy of the field instruments are described in Sections 6 and 13 of the QAPP. The equipment will be issued through a formal equipment tracking system and operated by trained personnel in accordance with manufacturers' recommendations, NJDEP guidance, EPA guidance, and/or appropriate ENSR SOPs.

4.1.1 Manual soil sampling

Manual soil sampling procedures are reserved for the obtaining of soil samples at or near the ground surface. Manual sampling, as the term is used here, refers to obtaining soil samples without the assistance of motorized equipment.

Manual soil sampling techniques are generally not acceptable for the sampling of volatile organic compounds due to the potential for the compounds to volatilize during sampling and to become lost to the atmosphere, resulting in erroneously low laboratory analytical results.

Manual methods of soil sampling include scooping soil directly from the ground surface with a trowel or similar device, obtaining samples using a shovel, or by using a hand auger (also called a soil auger) or similar device to core to a desired sampling depth and obtain samples.

Whatever the method of manual soil sampling utilized, preferred equipment construction is stainless steel. In the absence of stainless steel, sampling equipment should be new at time of use, dedicated to one sample location, and disposed after one use.

Proper manual sampling procedures require the sample to be obtained from decontaminated equipment. For obtaining soil samples from the surface, this means that sampling equipment shall be decontaminated prior to obtaining the sample. For samples at depth, this means that the sampling equipment (shovel, hand auger, etc.) shall be decontaminated both prior to the beginning of augering or digging activity and immediately prior to obtaining the soil sample.

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Soil samples are to be transferred to a stainless steel collection pan or another suitable collection pan lined with aluminum foil. In this collection pan the soil sample shall be homogenized (broken into fine pieces and thoroughly mixed), to obtain a representative sample of the entire sampling interval. This method does not apply for volatile organic analysis.

The sample shall then be transferred from the sampling pan into appropriate laboratory glassware using either a decontaminated stainless steel trowel or dedicated disposable equipment.

4.1.2 Geoprobe™ sampling

Geoprobe™ and similar systems of soil sampling utilize a hydraulically-powered percussion drilling machine to drive hollow soil samplers into the subsurface for the purposes of obtaining subsurface soil samples for examination and/or laboratory analysis. The equipment and hydraulics used in the drilling machine are generally mounted on a vehicle in order to provide both mobility around the jobsite and a stable drilling platform.

Generally Geoprobe™ sampling systems collect soil samples in a Macro-Core sampler, which is 4 to 5 feet long, 1.5 to 2-inch diameter hollow steel sampling barrel, generally lined with a disposable acetate liner. It is the Macro-Core which is hammered by the machine hydraulics into the ground for collection of soil samples.

Geoprobe™ sampling techniques work best in stable subsurface environments where borehole collapse is not a significant issue. In these environments, Geoprobe™ sampling can be conducted to depths below twenty-five feet with relative ease. However, in sandy soils and for deeper depths a steel point should be added to the tip of the macro-core to prevent soil from entering the core from borehole scraping as it is lowered to the next sampling interval.

Upon the Macro-Core's removal from the borehole, a cutting shoe and a drive cap are unthreaded from either end of the Macro-Core, and the acetate liner containing the soil sample is removed from the Macro-Core. The liner is cut with a knife (ENSR should request the driller to perform the cutting and insist on proper safety equipment as per the project health and safety plan). Following liner cutting, the soil sample should be screened with a calibrated PID and (if appropriate) sampled for volatiles directly from the liner ([see ENSR SOP 7111-Solids by EnCore](#)) or transferred to a stainless steel bowl as described in the Manual Sampling section for homogenizing and transferring to laboratory-provided glassware.

4.1.3 Split spoon sampling

Split-spoon soil sampling is generally conducted with the assistance of an auger drill rig or similar drilling rig.

Split-spoon sampling devices are typically constructed of steel and are most commonly available in lengths of 18 and 24 inches and diameters of 1.5 to 3 inches. The split-spoon consists of a tubular body with two halves that split apart lengthwise, a drive head on the upper end with a ball-check valve for venting, and a hardened steel cutting shoe at the bottom. The soil sample enters the split-spoon through the cutting shoe as the device is driven into the ground. A replaceable plastic or metal basket is often inserted into the shoe to assist with retaining samples. Once the sampler is retrieved, the drive head and cutting shoes are removed and the split-spoon halves are then separated, revealing the sample.

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The drilling subcontractor will lower the split-spoon into the borehole. The sampler is generally driven into the ground using the 140-pound hammer with a vertical free drop of 30 inches. The number of hammer blows required for every 6 inches of penetration will be recorded on the boring log by the ENSR geologist. Blow count information is used as an indicator of soil density for geotechnical as well as stratigraphic logging purposes. Once the split-spoon has been driven to its fullest extent, or to refusal, it will be removed from the borehole.

The split-spoon will be immediately opened upon removal from the casing/auger/borehole. The open sampler shall then be screened for volatile organics with a photoionization device (PID). If the Sampling Plan also requires individual soil sample headspace screening for volatile organic compounds, then a small portion of the split-spoon sample shall be removed and properly contained for that purpose. If required in the Project Sampling Plan, volatile organics sampling will also be done at this time.

Sample recovery will be determined by the project geologist/sampling engineer who will examine the soil core once the sampler is opened. The length of sample shall then be measured with a folding rule or tape measure. Any portion of the split-spoon contents which are not considered part of the true sample (i.e., heaved soils, borehole scrapings, etc.) will be discarded. If the sample recovery is considered inadequate for sample characterization or analytical testing purposes, another sample should be collected from the next vertical interval if possible before drilling is reinitiated, or else if required by the Project Sampling Plan, the borehole and sampling will be co-located.

Field personnel should be made aware that adequate sample recovery for stratigraphic logging purposes and/or headspace organic vapor testing purposes should be approximately 6 inches. Adequate sample recovery for analytical testing purposes should be a minimum of 12 inches and is somewhat dependent on the type of analytical testing required. In some cases, continuous sampling over a short interval, and compositing of the sample, may be required to satisfy analytical testing requirements. Larger diameter samplers may be used if large volumes of soil are required for analytical testing.

Following the logging of soil recovery, blow counts, volatile screening, and volatile sampling, the desired portion of the split spoon soil sample will be transferred to a stainless steel bowl as described in the Manual Sampling section for homogenizing and transferring to laboratory-provided glassware.

Please refer to [ENSR SOP 7115](#) regarding proper Split Spoon sampling techniques.

4.2 Decontamination procedures

All equipment used in the field investigations at the site will be cleaned before and after sample collection using a three-part decontamination procedure. Cleaning of equipment is performed to prevent cross-contamination between samples and to maintain a clean working environment for all personnel.

Decontamination procedures for sampling equipment used for the collection of samples for this investigation are as follows. First, equipment is be scrubbed with a solution of Liquinox (or equivalent laboratory grade, phosphate free cleanser, likealconox) and water. Following the initial scrub, the equipment will be rinsed in water and scrubbed to remove any remaining contamination. Lastly, a final water rinse using distilled/deionized water will be employed to remove any residual contamination. After decontamination, the equipment may be air-dried and wrapped with aluminum foil to prevent contamination if equipment is going to be stored or transported.

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Where possible, dedicated polyethylene sampling tools will be used to minimize the potential for cross contamination. Dedicated sampling equipment will only be used from clean, sealed packaging and will be disposed of with facility waste. [ENSR SOP 7600](#) details decontamination procedures for field equipment, and provides a step-by-step outline for field personnel to follow when decontaminating equipment.

4.3 Quality Control samples

QC samples collected during field activities will consist of trip blanks, field blanks, and field duplicates. The procedures for collection of these samples are discussed in Section 11 and [Table 1](#).

4.4 Soil characterization

An important aspect of site and remedial investigations is characterizing soils as an indicator of the geology and the hydrogeology of the site. Several methodologies have been established to characterize the soils when conducting field activities. ENSR uses a modified version of the Burmister System to describe the soil characteristics during any kind of investigative activity including soil sampling, excavating, geoprobing, well drilling, and geotechnical work.

When characterizing the soils at the site, the following information should be indicated in the field book: depths, blow counts, measurements or percentage of recovery, PID readings, water table, and/or sampling intervals. Based on the Burmister System, the following is a list of primary characteristics that need to be described in sequential order:

- Color
- Primary component (e.g. sand, clay, gravel, silt, bedrock, etc...) is the component that represents 50% or more of the sample. Should always be written in all CAPS.
- Secondary component(s) is the component that represents the remainder portion of the sample. The secondary component can be described as one or a combination of the following:
 - and is 35-50 % of the sample
 - some is 20-35% of the sample
 - little 10-20% of the sample
 - trace 1-10% of the sample
- Moisture content (dry, moist, or wet)
- Odors, staining, sheens

Based on the modified Burmister System, sands and gravel are further described as fine, medium or coarse grained. Silts and clays are primarily characterized by the plasticity. The following is a breakdown of plasticity and proper terminology that should be used to describe soils.

- Silt – non-plastic
- Clayey SILT – slight plasticity

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- SILT and CLAY – low plasticity
- CLAY and SILT – medium plasticity
- Silty CLAY – high plasticity
- CLAY – very high plasticity

If large pieces or fragments are observed, a short description should be provided. Cobbles are usually 3 to 9 inches and boulders are usually 9 inches or more. Additional descriptions of rock or fragments specific to the former Ingersoll Rand site soils are

- Chert – non-glossy black and white rock, very hard to break
- Limestone shale fragments – slight gray to grayish green with a powdery finish
- Dolomite – black and white peppered rock, very hard, with a slight glitter effect
- Fill material – coal, slag, black fine to coarse SAND (possibly foundry fill), building debris
- Quartz – white hard rock with a clear to opaque white finish. Yellow to reddish staining indicates naturally occurring iron deposits.

Examples of soil classification are

- Orange-brown silty CLAY, little fine to coarse sand, trace chert fragments, dry
- Dark brown SILT, some coarse gravel, trace coal and slag, dry, slight sheen and odor
- Orange-brown fine to coarse SAND and GRAVEL (weathered bedrock), little dolomite fragments, moist

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5.0 Groundwater investigation

5.1 Groundwater sampling procedures and equipment

To ensure that each sample collected is representative of the conditions at that location, and that the sample is neither altered nor contaminated by the sampling and handling procedures, ENSR will conduct all sampling as per the August 2005 NJDEP Field Sampling Procedures Manual (FSPM), the EPA Guidance on Low Flow Groundwater Sampling Procedures, USGS User's Guide for Polyethylene-Based Passive Diffusion Bag Samplers to Obtain Volatile Organic Compound Concentrations in Wells (USGS Reports 01-4060 and 01-4061, 2001), and applicable ENSR SOPs.

In order to insure the integrity of all groundwater samples, all samples will be handled in a manner consistent with the sample container, preservation, and holding time requirements specific to the analysis requirements of this investigation (see [ENSR SOP 7510](#)).

Field instruments that may be implemented in the groundwater remedial investigation will include water quality meters (Horiba U-22 or equivalent), electronic interface probes, photoionization detectors (PID- MiniRAE or equivalent with a 10.6 eV lamp), and a Field GC (PhotoVac Voyager or equivalent). All field measurement equipment will be maintained to ensure that measurements obtained are accurate and defensible. Procedures for maintaining the accuracy of the field instruments are described in Section 6 of the QAPP. The equipment will be issued through a formal equipment tracking system and operated by trained personnel in accordance with manufacturers' recommendations, NJDEP guidance, EPA guidance, and/or appropriate ENSR SOPs. [ENSR SOP 7130](#) considers the application of a variety of sampling equipment and associated concerns in the collection of representative groundwater samples.

5.1.1 Groundwater sampling program

Based on historic groundwater analytical results as well as the planned geophysical investigation, a comprehensive groundwater sampling and analysis program will be conducted. Subsequent monitoring events will be conducted semi-annually for parameters and wells identified during the initial phases of the groundwater investigation. The following groundwater sampling methods will be implemented:

- Prior to initiating the groundwater sampling program, synoptic groundwater elevation measurements will be collected. A PID will be used to screen concentration of VOCs in the well headspace just after the cap is removed. ENSR [SOP 7315](#) details the proper operation and calibration of a PID. Then, from the survey mark at the top of the well casing, a depth to product and/or water will be collected using a dedicated interface probe. Depth to bottom measurements, with the exception of those wells with detectable product, will be collected.
- Groundwater sampling logs will be recorded in the field as per the [FSPM](#), [New Jersey Technical Requirements](#) and will include measurements of field parameters, i.e. temperature, pH, conductivity, dissolved oxygen, turbidity, and oxidation-reduction potential. For conventional sampling, groundwater quality parameter measurements will be collected prior to purging, after purging, and after sampling. For low-flow purging techniques, groundwater quality parameters will be collected at

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timed intervals prior to and during purging to evaluate the stabilization of water quality parameters prior to sampling as directed in applicable guidance documents.

Conventional groundwater sampling

Conventional groundwater sampling procedures will be conducted using a standard three-volume purge method as described in the NJDEP FSPM. Using a Grundfos® or equivalent submersible pump, or a centrifugal pump with dedicated polyethylene tubing, three to five volumes of water will be removed from the well. Groundwater quality parameters will be collected prior to purging, after purging and after sampling. Samples will be collected via dedicated polyethylene bailers and transferred into laboratory supplied containers filled with appropriate preservative.

Passive diffusion bag sampling

Passive Diffusion Bag (PDB) samplers will be used on selected wells to determine vertical stratification of volatile organic compounds (VOCs). PDB samples will be collected for VOCs using the procedures described in the [FSPM](#). Vertical sampling locations will be selected based on the results of the geophysical investigation.

It is expected that PDB samples will be collected at depths corresponding to locations which water appears to be entering the wells and/or within 5 feet of both the groundwater surface and bottom of each well.

Deployment will consist of attaching PDBs (which are to be pre-filled with laboratory supplied, analyte free deionized water) or equivalent at pre-selected intervals along a dedicated braided polyester rope and weighting the end of the rope at the bottom of the well. If well(s) containing separate phase hydrocarbon (SPH) are selected for sampling, all SPH will be recovered prior to deployment and recovery to prevent sample contamination. PDBs will be retrieved from the wells after a minimum two-week stabilization period. Upon retrieval, PDBs will be punctured using a small, dedicated polyethylene tube to facilitate the transfer of the sample into the laboratory supplied container(s).

Low-flow purging and sampling

Low-flow purging and sampling may be conducted during the semi-annual groundwater sampling events for confirmation and comparison of PDB sample results and/or for monitoring natural attenuation parameters. These activities will be performed in accordance with the [FSPM](#) and [NJDEP Low Flow Purging and Sampling Guidance](#) document. A Grundfos® or equivalent submersible pump will be lowered to the desired depth interval (based on geophysical data, previous sample depths, etc.). A heat shroud must be used when sampling for VOCs. Water will then be purged from the well at a rate of approximately one-liter per minute (acceptable rates will range from 0.1 L/min to 5.0 L/min) through dedicated polyethylene tubing attached to an in-line water quality meter (Horiba U-22 or equivalent). Water quality parameters will be taken once water fills the in-line cell at a minimum of 5-minute intervals. Water quality parameters will be monitored for stabilization.

Stabilization will be defined when three consecutive water quality readings are within ± 0.1 for pH, $\pm 3\%$ for conductivity, ± 10 mV for oxidation-reduction potential (ORP), and $\pm 10\%$ for dissolved oxygen (DO) and turbidity. Water level will also be monitored during purging and the purge rate will be adjusted to minimize drawdown. Upon stabilization of water quality parameters, the water line will be severed prior to the in-line water quality meter and samples will be collected directly from the pump/tubing. Laboratory supplied sample bottles will be filled directly from the tube starting with VOC vials, then natural attenuation parameters.

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5.2 Purge-water management

Based on a combination of historical analytical results, results from the initial comprehensive round of groundwater sampling, location of the wells, and NJDEP approval, purge water generated during future groundwater sampling events may be discharged to the ground surface near the well head.

5.3 Decontamination procedures

All equipment used in the field investigations at the site will be cleaned before and after sample collection using a three-part decontamination procedure. Cleaning of equipment is performed to prevent cross-contamination between samples and to maintain a clean working environment for all personnel.

Decontamination procedures for sampling equipment used for the collection of samples for this investigation are as follows. First, equipment is be scrubbed with a solution of Liquinox (or equivalent laboratory grade, phosphate free cleanser) and water. Following the initial scrub, the equipment will be rinsed in water and scrubbed to remove any remaining contamination. Lastly, a final water rinse using distilled/deionized water will be employed to remove any residual contamination. After decontamination, the equipment may be air-dried and wrapped with aluminum foil to prevent contamination if equipment is going to be stored or transported.

Where possible, dedicated polyethylene sampling tools will be used to minimize the potential for cross contamination. Dedicated sampling equipment will only be used from clean, sealed packaging and will be disposed of with facility waste. [ENSR SOP 7600](#) details decontamination procedures for field equipment, and provides a step-by-step outline for field personnel to follow when decontaminating equipment.

5.4 Quality Control samples

QC samples collected during field activities will consist of trip blanks, field blanks, and field duplicates. The procedures for collection of these samples are discussed in Section 11 and Table 1.

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6.0 Sample documentation and chain-of-custody (COC)

Documentation of custody is one of several factors that are necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. A sample is considered to be in a person's custody if:

- it is in the actual possession of an authorized person; or
- it is in the view of an authorized person, after being in his/her actual possession; or
- it was in the actual physical possession of an authorized person and then was locked up to prevent tampering; or
- it is in a designated and identified secure area.

6.1 Field custody procedures

6.1.1 Field procedures

The field sampling personnel along with the appropriate Task Manager will be personally responsible for the care and custody of the samples until they are transferred or dispatched properly.

All sample containers will be labeled with a unique sample identifier that will consist of an alphanumeric sequence of a maximum of seven characters. Any other pertinent information regarding sample identification will be recorded in the field logbooks and on sample log sheets.

For groundwater, the first four digits will identify the sample location identification (e.g., monitoring well 1 = MW01, testhole 36 = TH36, etc.). For soil, the first 3 three digits will identify sample location.

Sample naming standards will be clearly stated in all sampling memoranda and workplans. If necessary, sampling depth interval will be designated by the next one to two characters. A standard convention for depth designation will be provided prior to sampling. The last character will be reserved for the further sample information such as designation of a filtered sample for dissolved metals using a "D" or as a duplicate sample with a "P" (applicable to groundwater samples). If depth or filtration designation is not needed at a particular location, the last three characters of the sample ID may be omitted.

The exceptions to the above-described sample ID code are field and trip blanks. Field blanks will be identified using an "F" followed by the six digit date code for the collection date (i.e., a Field Blank collected on April 8, 2002 would be identified as F040802. Trip blanks will be identified using a "T" followed by the six digit date code for the collection date (i.e., a Trip Blank collected on April 8, 2002 would be identified as T040802).

Labels will be completed prior to or during the sampling event for each sample. Labels will be completed with the site name, sample ID, sample collection date and time, analysis requested, and preservative (if any) and will be initialed by the sample collector. Waterproof labels (provided by the laboratory) will be completed using waterproof ink.

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All relevant information will be transferred to a laboratory-supplied chain of custody (COC) form and signed by the individual responsible for the sampling.

All field personnel should be aware that copies of the COC and field documentation must be supplied to the appropriate Task Manager on the same day as the sampling event. The appropriate Task Manager will review field activities to determine whether proper custody procedures were followed during the fieldwork and will decide if additional samples are required. The appropriate Task Manager will notify the Quality Assurance Manager of any deficiencies encountered during the review of documentation and will provide a copy of the reviewed/corrected COC to the Database Manager.

6.1.2 Field notebook/documentation

Field notebooks will provide the means of recording the data collecting activities performed. As such, entries will be described in as much detail as possible so that persons going to the site could reconstruct a particular situation without reliance on memory.

Field notebooks will be bound, numbered, field survey books or notebooks. Field notebooks will be maintained by the Assistant Project Manager until they are archived. Each notebook will contain the notebook number, project identification, "return to" information, and project start and end dates. (The notebook number will be based on a numbering system described in the [ENSR Ingersoll Rand Project SOP for Field Books Number and Filing System](#).) Entries into the notebook will include the Project name and number, date, start-time, weather, summary and purpose of planned field activities, and the names of all sampling team members present. The names of visitors to the site (including subcontractors), the times and dates of their arrival and departure, and the purpose of their visit, will also be recorded in the field notebook.

Content of the field notebook will include, but not be limited to, measurements made and samples collected, descriptions of sampling locations, sample collection times and depths, calibration information for field equipment, etc. Health and Safety notations will be entered approximately every two hours. The Health and Safety entries in the field book will start with "H&S" instead of the time. Health and Safety entries will include a note about any health and safety issue encountered during field operations or will state "no health and safety issues encountered". Information recorded in the field notebook may be transferred to ENSR standard logs used to record and present field data. These logs may include:

- Geologic/Soil boring logs,
- Well construction logs,
- Well development logs,
- Groundwater purge and sample logs,
- Water level and product thickness records,
- Chain-of-custody forms, and
- Environmental sample logs.

Logs will include entries in every blank, with appropriate use of the abbreviations NA (not applicable) and NR (not recorded). All "NR" entries should be accompanied by an explanation. All entries will be recorded in waterproof ink or marker, and signed and dated by the person making the entry. No erasures will be made. If

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an incorrect entry is made, the information will be crossed out with a single strike mark, the correct entry recorded, and the change initialed and dated by the person making the correction.

Special visual observations and detection of odors shall be indicated in the field book. However, careful attention shall be given when attributing the source or substance of the observations.

All field personnel should be made aware that a photographic log will also be maintained by ENSR field personnel. Field documentation of each photograph will be recorded in the field notebook and will contain a description of the object and field of view being photographed, type and lens size (if applicable) of camera, direction faced, frame number, time and date the photograph was taken, identity of photographer, and indication of scale or scale reference. The reference number assigned to the photograph and described in the log will be written on the back of the photograph and/or the file name of the electronic version will be saved with the reference number. Copies of the photographic logs will be provided to the Assistant Project Manager and will be filed in a central location in the Piscataway office. The Quality Assurance Manager will be notified when photographic logs have been created.

6.1.3 Transfer of custody and shipment procedures

Samples will be accompanied by a properly completed chain-of-custody form. At the time the sample possession is transferred, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents the transfer of custody of samples from the sampler, to another person, to a mobile laboratory, to the permanent laboratory, or to/from secure storage locations.

Minimum information recorded on the chain-of-custody record in addition to the signatures and dates of all custodians will include the following information in the appropriate spaces on the COCs:

Name (for report & invoice): Gregg Micalizio

Company: ENSR

Address: 20 New England Ave

City: Piscataway, NJ

Phone: 732-981-0200 Fax: 732-981-0116

Samplers Name: PRINT your name and this person must be the same person that relinquishes the COC.

PO#: ENSR's Purchase Order (provided to the sampler by the Task Manager)

Site/Project Identification: Ingersoll Rand-Phillipsburg

Check off NJ box for location of site and Regulatory Program: ISRA

Under Lab Use Only: Project No.: Is the quote number associated with the PO# which will be provided to the sampler by the appropriate Task Manager. DO NOT FILL in the JOB NO.

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Special Instructions are to be filled in on every page of the COCs and page numbers must be written at the top right corner of the COC.

The following information should be noted in the field book:

- Sample Identification,
- Sampling date and time,
- Type of sample (grab or composite),
- Sample description (matrix),
- Sample preservative, and
- Analyses to be performed.

Samples will be transported, as needed, from the field to the laboratory by courier, laboratory representative, or ENSR personnel. Samples will be packaged properly and be accompanied by a separate signed chain-of-custody record identifying the contents in each sample cooler. If a laboratory courier is used, the courier will sign the chain-of-custody before departing the site. The coolers will be locked or secured with strapping tape and sealed with custody seals. The preferred procedure is to attach a custody seal to the front right and back left of the cooler. The back copy of the COC will be detached and kept as part of the field records. The original record and remaining copies will accompany the coolers.

If samples are shipped to the laboratory via overnight air transportation (e.g., Federal Express) or by commercial courier, the chain-of-custody record will be enclosed in each sample cooler and the cooler will be taped closed with fiberglass tape covering the chain-of-custody seals.

6.2 Laboratory custody procedures

ENSR has contracted with NJDEP-certified laboratories and will not perform an on-site audit of laboratory standards. However, the following procedures will apply regarding laboratory custody procedures:

The laboratory will be responsible for receiving the samples and logging them in. On arrival at the laboratory, all samples will be inspected thoroughly to confirm that the integrity of the samples and containers has not been compromised. The cooler custody seals will be inspected to verify that they are still intact and were properly signed and dated by the field sampling team. The individual sample containers will be inspected to verify that each has a sample label. The condition of the samples may be noted on the chain-of-custody form under "Remarks".

The sample containers will be checked against the accompanying chain-of-custody to verify that the cooler contents are identical to the samples described on the chain-of-custody documents. If discrepancies exist, they will be reported to the Task Manager by the Laboratory's Project Manager, who will immediately notify the ENSR Quality Assurance Manager. The problem will be resolved, in writing (email, fax, memo, etc.), before the samples are logged in.

After the Sample Custodian has determined that the samples are in satisfactory condition and the documents are in order, each sample will be assigned a unique laboratory identification number. A sample log-in sheet

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will be initiated and will serve as documentation as to the condition of the samples upon receipt and the cross reference between field identification numbers and assigned laboratory numbers.

After the samples have been entered into the laboratory tracking system, copies of the log-in forms and chain-of-custody records will be sent to the appropriate Task Manager, who will verify that the specified samples and parameters correspond to the samples and parameters identified in the QAPP. The samples will be placed in a secured storage area, under the conditions called for by the analytical method, until taken for analysis. Samples removed from the secure area for preparation or analysis will be tracked using internal custody forms.

No samples will be delivered on Saturday or Sunday.

6.3 Calibration procedures

This section describes procedures for maintaining the accuracy of all the instruments that are used for conducting field tests and laboratory analyses. These instruments should be calibrated at the frequencies described below and the information shall be recorded in the appropriate field book.

6.4 Field Instrument Calibration

Instruments used to gather, generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications. Field instruments will be issued through a formal tracking system and operated by trained personnel, in accordance with the appropriate SOPs or manufacturer's specifications. Each instrument used in the field will be examined daily by the ENSR appropriate Task Manager and/or his designee to verify that it is operating properly.

Field instruments for the former Ingersoll Rand Phillipsburg facility field investigation will include a PID, interface probe, water quality meter, a Field GC, a GIS receiver, and a suite of geophysical probes. Each instrument will be calibrated before its initial use and the calibration checked periodically according to manufacturer's recommended requirements. Calibration procedures will be documented in the field records. Documentation will include the date and time of calibration, the identity of the person performing the calibration, the reference standard used, the readings taken, and any corrective action.

MiniRAE photoionization detector (PID)

The MiniRAE PID is calibrated using ambient air as a zero gas and 100 ppm isobutylene as the span gas. Depending on the specific model used during the field investigation, the calibration mode will be entered using the interactive menu and the unit will be zeroed and calibrated with the span gas. Calibration will be performed each day prior to site activities and checked mid-day to determine operating accuracy. If PID readings are outside of 15% of the span gas concentration, the unit will be recalibrated. Calibration will be performed according to the manual provided with the unit. [ENSR SOP 7315](#) details operation and calibration of PIDs, and provides step-by-step operation, calibration, and troubleshooting information.

Interface probe

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The electronic interface probe does not require calibration, however, batteries will periodically be checked and the tape will be kept clean and free of obstructions that may cover markings. Additionally, to minimize personal interpretation of readings, the Task Manager will be solely responsible for collecting water level and product thickness readings. Please follow decontamination procedures as noted in the [SOP 7600](#).

Water quality meter (Horiba U-22)

The Horiba U-22 is an integrated multi-parameter water quality meter with a single probe that integrates pH, temperature, conductivity, dissolved oxygen, turbidity, ORP, salinity, and dissolved solids. The unit is calibrated using a stock solution provided by the manufacturer. The probe is submersed into the calibration solution such that the liquid covers all of the probe's sensors (a calibration cup provides indication of optimum fluid level). The calibration button (CAL) is then depressed once followed by the enter button. The unit will then automatically calibrate to each parameter and notify the user of any calibration errors.

In the event that a calibration error is noted, the field sampling team will attempt to correct the error as per the unit's instruction manual. Calibration will be conducted each day prior to beginning site activities.

Field gas chromatograph (Field GC)

Prior to sample analysis, the Photovac Voyager will be calibrated with stock solution for priority pollutant VOCs. A three-point calibration curve encompassing the expected range of analyte levels will be performed for these compounds every day. Calibration check standards will be performed every 10 samples and/or at the end of each day. If the recoveries of the calibration check standards are not within 70% of the true value, a new initial calibration curve will be performed and the affected samples will be reanalyzed.

GPS receiver

The Trimble GeoExplorer 3 does not require any calibration unless using the unit for navigation. When in Navigation Mode on the Compass screen, the "Option" button is depressed to show a menu list. Select "Calibration" and follow the on-screen instructions. The user will be directed to press "Enter" and rotate the unit through 360 degrees over 10-seconds. This will calibrate the internal digital compass. This calibration procedure should be conducted prior to using the GPS for Navigation purposes.

6.5 Laboratory instrument calibration

ENSR has contracted NJDEP-certified laboratories, STL-Edison and Accutest Laboratories, to perform all laboratory analysis of soil and groundwater sampling performed by ENSR at the former Ingersoll Rand facility. ENSR does not perform on-site audits of laboratory procedures; however, monthly audits using database queries will be implemented to measure accuracy and precision values obtained from the laboratories. In addition, the following minimum standards for calibration are expected to be performed.

Calibration is required to ensure that the analytical system is operating correctly and functioning at the proper sensitivity to meet the detection limits established for the method. These methodologies include specific instrument calibration procedures and frequencies that will be followed by the laboratory. If an instrument has not been properly calibrated and the quality of the data has been adversely affected, the corrective actions outlined in the methodologies will be implemented.

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Calibration standards will be prepared from materials of the highest available purity. As these materials are received, they will be logged in. To establish instrument calibration, working standards will be prepared daily from more concentrated working stock solutions. The latter will be prepared monthly (or more frequently) from super stock solutions prepared every six months (or more frequently). Super stock solutions of elements (for metals analysis) will be purchased commercially. All organic standards will be refrigerated or frozen. Inorganic standards will be refrigerated as necessary. Standards will be stored separately from samples. Data regarding standard preparation will be recorded in the standards logbooks.

The laboratory maintains documentation for each instrument which includes the following information: instrument identification, serial number, date of calibration, analyst, calibration solutions, and the samples associated with these calibrations.

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7.0 Sample preparation and analytical procedures

7.1 Laboratory analytical procedures

All samples collected during the initial field investigation sampling activities at the former Ingersoll Rand Phillipsburg facility will be analyzed by a NJDEP-certified laboratory. The laboratory will adhere to the USEPA Protocols for sample preparation and analysis dictated by the requested analytical method. Additionally, the laboratory will adhere to the reporting requirements of a NJDEP-certified facility producing NJ-Reduced format deliverables. As previously described, the laboratory will provide electronic deliverable data in both HazSite format as per [NJDEP's 1999 Electronic Data Interchange Manual](#) and in standard EQUIS format.

7.2 Field analytical procedures

The procedures for the field measurements and analyses that will be conducted are summarized in Sections 3, 4, 5, 6, and 7 and [Table 1](#). Field analysis preparation procedures are described below.

A checklist will be provided to determine what field equipment is necessary to complete the soil and groundwater remedial investigations. All field instruments and supplies (except those operated by ENSR subcontractors) will be obtained at least one day prior to beginning the field investigation activities. All instruments will be fully decontaminated prior to being used on site and will undergo a full calibration as per manufacturer's recommendations. All equipment will be checked to verify that it is in full working order and all ancillary equipment (e.g., syringes and sample vials for the GC) is available.

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8.0 Data management process

This section provides a description of the project data management, outlining the database structure and control mechanisms for detecting and correcting errors and preventing loss of data during data compilation and data entry.

On behalf of Ingersoll Rand, ENSR developed and maintains a database system storing soil, groundwater and geologic data. The database functions as a portal to the voluminous data collected at the site and allows its integration into various modeling, visualization, and analytical software packages. Analysis will be performed on the database to determine contaminant concentration trends, contaminant migration pathways, and to determine site-specific degradation rates for contaminants of concern.

A detailed data management plan [still in draft – as of 5/1/06] has been developed and will be stored and implemented as a standard operating procedure.

8.1 Database development overview

The soil, geologic and groundwater data acquired during the remedial investigation will be imported into an Environmental Quality Information System (EQulS) database application. These three databases will be used as the final repository for all data related to the Ingersoll Rand site, as described in Section 8.2.

Field data will by necessity be entered manually or via an electronic field data collection device. Analytical Data will be provided electronically by the laboratories and imported directly into the database. A compilation of analytical and field data, a so-called electronic data deliverable (EDD), will be submitted to NJDEP compliant with NJDEP requirements

Because of the complexity inherent in bedrock groundwater systems, ENSR will develop a geologic database based upon the drilling logs of the monitoring wells, recovery wells, and test holes previously installed onsite. These logs will be used to develop geologic cross-sections and/or a geologic model, and bedrock topographic maps to assist in the analysis of groundwater flow patterns. Upon completion of the geophysical investigation (described in the following section), the geologic database will be modified with the pertinent findings.

GPS data will be integrated into the investigation to verify and supplement historic and future locational data. GPS data will be collected and differentially corrected according to guidelines set forth in [NJDEP GPS Data Collection Standards for GIS Data Development](#) (NJDEP, 2002).

To allow the design of project specific queries (i.e., queries not part of the standard EQulS application) a portal database will be setup, linking to the environmental data stored in the EQulS database system. This portal database will store specific queries designed for the purpose of analysis, audit and mapping.

The Geographic Information System (GIS) software ArcGIS 9 (or higher) from ESRI will be used to support some of the data extraction, presentation, and analysis tasks.

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8.2 EQuIS database structure

The EQuIS database is a relational database using Microsoft's Access database program as a base. The database will be used to store and manipulate the extensive amount of available electronic data. As necessary, based on product updates and/or ENSR modifications, the database will be revised and adapted to meet the specific needs of this project.

A relational database is a collection of data items organized as a set of formally-described tables that are linked into a logical structure. The database application includes tables, queries, forms, and reports. Tables are collections of data on a given topic. Their content and the relationships defined between the different tables form the core of the database applications. Queries present a certain view of the data contained in tables, or may be used to update, append or edit data records. Forms constitute the "graphical user interface" (GUI) to the data. They are used to enter new data, view existing data, or perform operations in a user-friendly manner. Reports are used to provide printed outputs of the data or query results.

EQuIS will generally serve as the database's GUI. EQuIS consists of different applications to perform the tasks listed below:

- System Administration – to manage the project database and user access;
- Chemistry Import – to import EDD into a temporary database and verify data in EDD against existing data;
- Chemistry Reference Table Maintenance – add or update reference data to the existing reference tables;
- Chemistry Merge – to merge imported data into permanent database;
- Geology Import – to import EDD into permanent database;
- CrossTabWriter – to create reports of selected datasets.

8.2.1 Data tables

The EQuIS structure is divided into two types of tables, data tables and reference tables. The data tables consist of 40 separate tables that contain various types of site specific information, which are then linked to other data tables and reference tables. Within a given table, uniqueness of information is enforced through a single unique key field or unique combinations of fields.

Each of these tables is linked to each other through a variety of relationships with enforced referential integrity. Referential integrity means that records in each main (or so called "parent") table are unique but may be associated with one or more derivative (or so-called "child") records in other tables.

8.2.2 Reference tables

In addition to the 40 main data tables, 48 reference tables are present to provide the possible range of values or categories for many of the fields in the main data tables.

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8.2.3 Queries

Standard EQulS queries will remain unaltered. Any project specific queries are stored in Portal database.

8.3 Field data

Data that are generated during sample collection and sample preparation will be manually entered into the field logbook. In 2006, it is planned that data from these sources will be entered into an Excel workbook template in the field. These data include station location description, station names, sampling dates, sample identification codes, and additional station and sample information (e.g., water depth, sample type).

8.4 Laboratory data

The Laboratory Information Management System (LIMS) is the central data management tool for each laboratory. All manual data entry into the LIMS is proofed at the laboratory. All data collected from each laboratory instrument, either manually or electronically, are reviewed and confirmed by analysts before reporting. The LIMS is used for every aspect of sample processing, including sample log-in and tracking, instrument data storage and processing, generation of data reports for sample and QC results, and preparation of EDD.

Laboratory data will be loaded directly into the EQulS database from the EDD.

8.5 Data import

Data that will be used in the soil, geologic and groundwater databases may be obtained electronically from qualified sources in the form of databases and/or spreadsheets. Laboratory analytical data will be received in an EQulS standard format (so-called "4-File-Format"), combined with field data and then imported into the chemistry database.

Geologic data will be received in both hardcopy and electronic form from ENSR's geophysical investigation subcontractor. This data, if possible, will be requested in a format which can be directly imported into an EQulS database. If this is not possible, data will be manually entered into the database.

Note that the EQulS database is designed to enforce referential integrity of the information. The referential integrity check prevents the import of unassociated (or so-called "orphan") data (i.e., data without associated sample, location, or site). For example, "child" records can only refer to existing "parent" records (e.g., a sample record must be linked to an existing sampling station). The use of reference tables to provide a limited choice of valid values for some of the fields in the main tables also ensures minimal error in the content of the database. This ensures consistency of values and codes across data sources. For example, groundwater quality parameters are limited to values listed in the Parameters reference table. In many cases, unique identifiers will be defined that prevent the duplication of information such as Well ID, etc. Unique records will be defined based on a combination of key fields, as appropriate for the type of information stored within a data table. For example, a unique sample can be defined as a sample taken at a given well, on a given date, and depth, and of a certain sample type (normal or field duplicate). A unique groundwater quality record would then be defined as a sample (as defined above) analyzed for a given water quality parameter.

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8.6 Data quality

Hardcopy data may be obtained from Ingersoll Rand and may be supplemented by hardcopy and/or electronic data obtained from federal and state agencies. No attempt will be made by ENSR to directly verify the accuracy the hardcopy or electronic information contained in these files, since the originating laboratory, government agency, or other originating source are assumed responsible for the quality control of these data files. However, a data review for applicability will be conducted. If data quality is deemed questionable, metadata may be reviewed and the questionable data may be compared to similar information sources. The task managers and the database manager will then make a determination whether or not the data are reliable. If the data are determined to be unreliable, a detailed QA/QC check may be performed if the data was manually entered from hardcopy original reports. **If the data was obtained from an outside source an attempt will be made to prepare the data conform the existing data structure.** If the data is considered unreliable and incomplete, the data will be removed from the database.

ArcGIS 9 (or higher) from ESRI interface may be used to present a variety of background information. Data sources will include, but not be limited to, New Jersey Department of Environmental Protection, the United States Environmental Protection Agency, and other State and Federal resources.

Soil and groundwater analytical data from laboratory analysis, and geophysical logs from the geophysical investigation, will be provided electronically and will be held to high data quality standards. All electronic data received from analytical laboratories will undergo a limited data validation by the task managers to verify precision, accuracy and completeness. Upon the validation the task manager will release the electronic data to the database manager for further processing. Files which do not pass validation will be returned to the laboratory for correction.

Field data will be reviewed by the task manager for accuracy and completeness, and any errors will be corrected before the data are uploaded to the EQulS database and approved for release to data users.

Sample specific data (i.e., field data) will be entered manually to complete the files prior to import into the database. As such, data entry errors may originate at the original data source or during ENSR data entry. To minimize error, NJDEP's Electronic Data Submittal Application (EDSA) will be used to assess the completeness of laboratory supplied electronic data and manually entered field data once ENSR completes data entry.

As a second precaution, the analytical and field data will be imported into the temporary chemistry database first before merging data with the permanent database. Any inconsistencies or incompleteness of data that may be caught at this point of time will be corrected.

Finally, the database manager will provide a database printout to verify database entries against the hard-copy laboratory data packages.

Geologic data will be checked manually by an ENSR geologist. ENSR will coordinate with the geophysical subcontractor for correction of data, as necessary.

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8.7 Additional verifications

No systematic attempt will be made to verify the electronic or hardcopy data from outside sources. However, data will be compared with current and historic data and analyzed for trends and deviation from projected values. Reported values that do not compare with historical data or trend values will be further investigated and verified against the original source of the data and corrected, as necessary.

8.8 Interoperability of databases

As mentioned above, the soil, groundwater and geologic EQulS database are constructed using the predefined table structure, taking into account specific project needs. Special attention will be paid to ensure interoperable data reporting and analysis across the three databases as data and/or project needs may change over time. The main aspects to ensure interoperability are:

- Upgrades of EQulS and related software;
- Review and updates of data;
- Design of project specific queries stored in the Portal database (i.e., queries not part of the standard EQulS application).

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9.0 Data collection, validation, and reporting

9.1 Data collection

9.1.1 Field measurements and sample collection

Raw data from field measurements will be recorded directly in field notebooks or on the sample logs discussed in Sections 6 and 9 of this QAPP. Field data presented in data reports will be presented in original, unedited form and will comprise logs and chain-of-custody forms.

9.1.2 Laboratory services

Calculations of sample concentrations and QC measurements (e.g., recoveries) will be performed in accordance with the procedures cited in Sections 11 of this QAPP.

9.2 Non-direct measurements

The suitability of use of non-direct data (historical reports, maps, literature searches, previously collected analytical data) will be evaluated by the project manager and limitations potentially placed on its use.

The data collected under this QAPP have been designed to be of sufficient quality to meet the program objectives.

9.3 Data Quality Assurance procedures

An initial review of data obtained from field measurements will be performed by the ENSR Task Manager or a designee of the Quality Assurance Manager. This review will consist of checking procedures utilized in the field, ensuring that field measurement instruments were properly calibrated, verifying the accuracy of transcriptions, and comparing data obtained in the field to historic measurements (see Figure 1, Step 1: 'Review of Field Measurements').

An internal review of analytical data will be the responsibility of laboratory personnel. The analyst will initiate the data review process by examining and accepting the data. The completed data package will then be reviewed by the laboratory Data Reviewer. The Data Reviewer will provide a technical review for accuracy and precision according to the methods employed and laboratory protocols. He/she will also review for completeness of the data package (i.e., all pertinent information is included, all appropriate forms are signed and dated, calculations are correct, and holding times and QC sample acceptance criteria have been met). A nonconformance summary will be provided by the Laboratory. The Task Manager responsible for the samples submitted will review the nonconformance summary and data to ensure that the data package meets ENSR's specifications. These specifications are listed in Section 11 and [Table 1](#) and include: completeness, technical holding times and sample preservation; laboratory and field blank contamination, field and laboratory duplicates, MS/MSD recoveries and RPDs, and laboratory control sample recoveries. The Task Manager will review the data package for these specifications prior to delivering the data package to the Database Manager (see Figure 1, Step 2: 'Limited Validation of Laboratory Results'). Before laboratory data will be loaded into the

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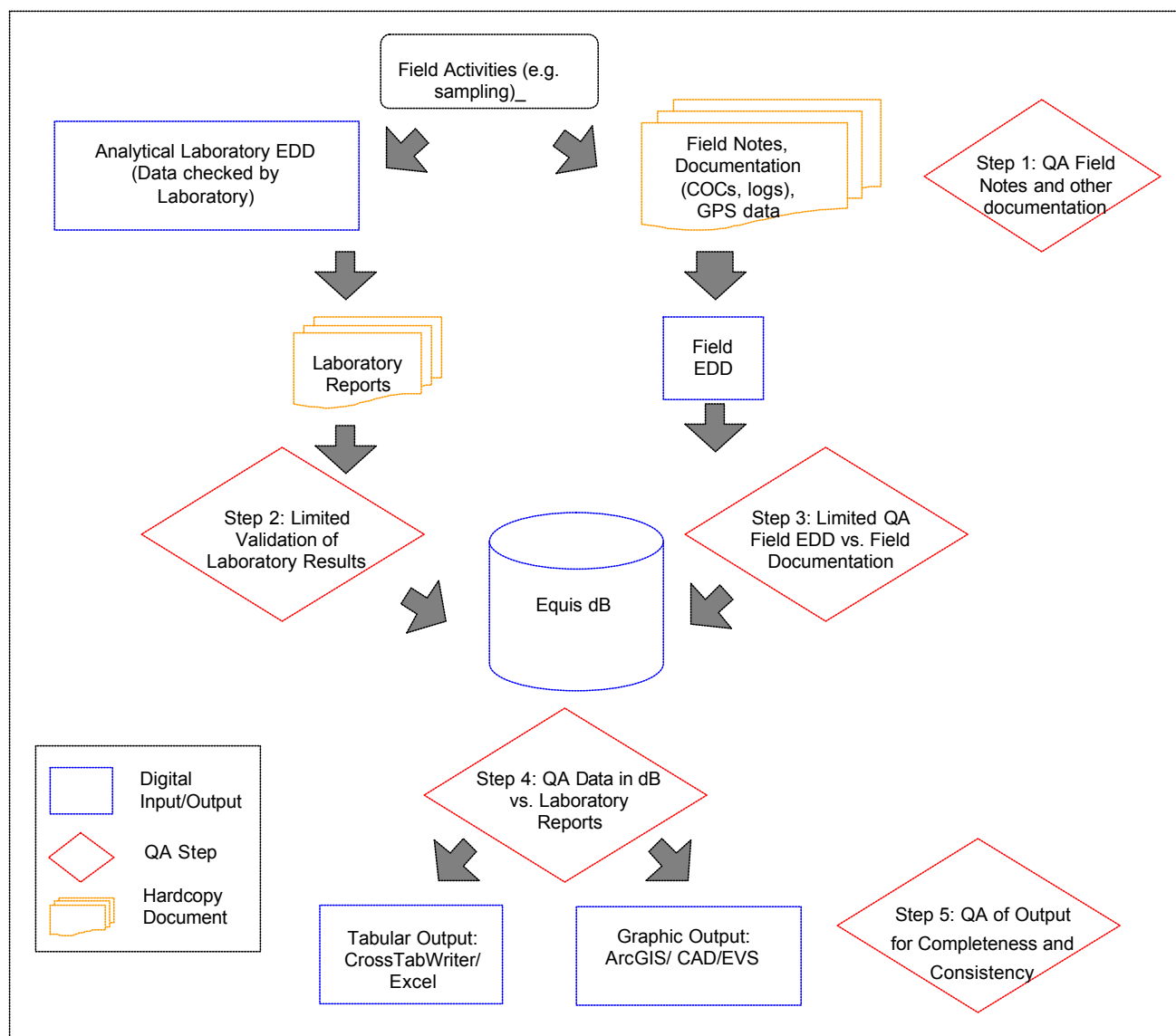
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database the electronic Field EDD is created based on Field Notes, Chain-of-Custody (COC) and GPS data and then reviewed for completeness and correctness versus the Field Notes and COC (see Figure 1, Step 3: 'QA Field EDD vs. Field Notes, COC'). The Database Manager will load the Field and Laboratory EDD into the database and prepare a QA for each data package to be reviewed versus the hardcopy of the Laboratory Reports (see Figure 1, Step 4: 'QA Data in dB vs. Laboratory Reports'). Finally, after Tabular and Graphic Output has been generated the Task Manager will review the Output for completeness, correctness and consistency (see Figure 1, Step 5: 'QA Output for Completeness and Correctness'). Any errors discovered during steps 4 to 5 will be addressed to the Database Manager and resolved by her/him directly in the database.

Figure 1: Quality Assurance Steps from Data Collection to Data Output



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9.4 Data reporting

Field data will be presented as site base maps, showing all sampling locations, as raw data (e.g., boring logs, groundwater sampling logs), and as interpreted data (e.g., groundwater contour maps).

One copy of the laboratory report and NJ HazSite EDD diskette will be provided in each final remedial investigation report submitted to NJDEP. Data included in the laboratory report is as follows:

- a narrative describing any problems encountered during analysis including a non-conformance report;
- copies of chain-of-custody forms;
- method summary and references;
- summary of laboratory identification numbers, with cross reference to field identification numbers;
- receipt, extraction, and analysis dates;
- analytical results, including all QC results;
- summary of lab qualifiers; and
- tentatively identified compound listing for VOC+10 and BN+15 analyses.

The analytical data reports received from the laboratory will be presented in a NJ-Reduced deliverable format. Copies of the chain-of-custody forms received at the laboratory, copies of laboratory log-in documentation, sample preparation bench sheets, and instrument run logs will be included in the data packages so that dates of sample preparation and analysis can be reviewed.

Preliminary laboratory results for soil and groundwater sampling will be delivered electronically within 14 and 21 days, respectively. Receipt of the hard copy of the data is delivered within 21 to 28 days.

9.5 Quality Assurance of reporting activities

The QAM and Task Managers responsible for preparing reports will conduct a kick-off meeting to review quality assurance procedures and templates required for preparing reports. The Report Quality Assurance (QA) kick off meeting will include:

- Organization of computer files, file naming procedures, and file retention.
- Decision on legend and notes content for figures and tables.
- Review of standard ENSR formatting styles for text and tables within text.
- Review of special table formatting per previous experience with report production for the former Ingersoll-Rand facility. Report QA and [Table production guidelines](#) are electronically filed in the IR directory.
- Review [Standard Operating Procedures for Report Production for IR](#).
- Assignment of quality assurance responsibilities and chain of command.
- Review QA tasks using templates created for these tasks (see below).

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- Interfacing with engineering and CADD personnel as necessary and reviewing [engineering and CADD SOPs](#).

The following templates have been created to give structure the report creation process. The templates are included in Appendix A and are located in the [QA electronic directory](#).

- QA Checklist: Figures
- QA Checklist: Tables
- Detailed QA Checklist: Tables: Layout QA
- Detailed QA Checklist: Tables: Layout QA
- Detailed QA Checklist: Tables: First QA
- Detailed QA Checklist: Tables: Second QA
- Detailed QA Checklist: Tables: Final QA
- Detailed QA Checklist: Tables: Status
- Detailed QA Checklist: Matching CADD Tables and Figures
- QA Checklist: Database Audit: Missing Analyte Table
- QA Checklist: Database Audit: dt_result
- QA Checklist: Database Audit: Summary Tables

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10.0 Internal quality control checks

10.1 Field sample collection

The assessment of field sampling precision will occur through the collection and analysis of field duplicate samples. The accuracy of field sampling will be evaluated by trip blanks and field blanks. The procedures associated with the collection of these samples, and the frequency of collection, are defined in Table 1 and Sections 3, 4, 5, and 6 and [Table 1](#) of this QAPP.

10.2 Field measurement

QC procedures for pH, temperature, specific conductance, water level measurements, and Field GC analysis will include checking the reproducibility of the measurement by obtaining duplicate readings on a single sample, by calibrating the instrument or by comparing it to a known standard, and by analyzing QC check samples. Instrument calibration and check sample procedures are discussed in Section 6 of this QAPP. Duplicate measurements are discussed in Sections 6 and 11 and [Table 1](#) of this QAPP.

10.3 Laboratory analysis

Precision and accuracy determinations for laboratory measurements will be in accordance with the methodologies cited in Section 11 of this QAPP. These parameters will be assessed for organic analyses through the use of method blanks, surrogate spikes, internal standard areas, gas chromatograph/mass spectrometer tuning, and MS/MSD samples. For inorganic analyses, instrument blanks, reagent/preparation blanks, MS/MSD samples, and laboratory duplicate samples will be used. Corrective action is discussed in Section 14 of this QAPP. Qualification of the data based on the QC results is discussed in Section 11 of this QAPP.

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11.0 Data assessment procedures

The overall QA objective is to develop and implement procedures for field sampling, chain of custody, laboratory analysis, and reporting that will provide results that are legally defensible in a court of law. Specific procedures for sampling, chain of custody, instrument calibration, laboratory analysis, reporting of data, internal QC, audits, preventative maintenance of field equipment, and corrective action are described in other sections of this QAPP. The purpose of this section is to address the specific objectives for accuracy, precision, completeness, representativeness, and comparability. These terms are described below.

11.1 Field measurements

Field data will be reviewed by the ENSR Task Manager for compliance with the workplan, QAPP, [FSPM](#), and SOPs as applicable. Precision, accuracy, and completeness will be evaluated based on the methods and equations described in the following subsections.

11.2 Laboratory data

ENSR has contracted NJDEP-certified laboratories, STL-Edison and Accutest Laboratories, to perform all laboratory analysis of soil and groundwater sampling performed by ENSR at the former Ingersoll Rand Phillipsburg facility. Laboratory analytical results will be assessed for compliance with precision, accuracy, completeness, and sensitivity requirements as described in the following sections by the laboratory. Please note, a validation of results will be performed by the task managers for the following measurements prior to import of laboratory data into the project databases.

11.2.1 Precision

11.2.1.1 Definition

Precision is a measure of the degree to which two or more measurements are in agreement.

11.2.1.2 Measurement of precision

ENSR has contracted NJDEP-certified laboratories, STL-Edison and Accutest Laboratories, to perform all laboratory analysis of soil and groundwater sampling performed by ENSR at the former Ingersoll Rand Phillipsburg facility. ENSR will review the nonconformance summaries reported by STL-Edison and Accutest which include Relative Percent Difference (RPD) measurements outside laboratory QC limits by analyte group.

ENSR expects that the precision of laboratory analysis will be assessed by comparing the analytical results between MS/MSD samples for organic analysis, and laboratory duplicate analyses and MS/MSD samples for inorganic analysis. The RPD will be calculated for each pair of duplicate analysis using the following equation:

$$\% RPD = \frac{(S - D)}{\frac{(S + D)}{2}} \times 100$$

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where S = original sample data
D = duplicate sample data

11.2.1.3 Field precision objectives

Precision is a measure of the degree to which two or more measurements are in agreement. Field precision is assessed through the collection and measurement of field duplicates at a rate of one duplicate per twenty field samples. Precision will be measured through the calculation of relative percent difference (RPD). The equation for this calculation is presented in Section 11.2.1.2 of this QAPP. The objectives for field precision RPDs are 25% RPD for aqueous samples and 30% RPD for solid samples.

Precision in the laboratory is assessed through the calculation of RPD for duplicate samples, either as matrix spike/matrix spike duplicates (MS/MSDs) or as laboratory duplicates, depending on the method.

11.2.1.4 Laboratory precision objectives

Precision in the laboratory is assessed by calculating the RPD for duplicates. The equation for this calculation is presented in Section 11.2.1.2 of this QAPP. Matrix spike/matrix spike duplicate (MS/MSD) samples will be used to evaluate the precision of organic analyses. Laboratory duplicates as well as MS/MSD samples will be used for inorganic analyses. Precision control limits are defined in laboratory SOPs.

11.2.2 Accuracy

11.2.2.1 Definition

Accuracy is the degree of agreement between the observed value and an accepted reference value.

11.2.2.2 Measurement of accuracy

ENSR has contracted NJDEP-certified laboratories, STL-Edison and Accutest Laboratories, to perform all laboratory analysis of soil and groundwater sampling performed by ENSR at the former Ingersoll Rand Phillipsburg facility. ENSR will review the nonconformance summaries reported by STL-Edison and Accutest which include monitoring recovery measurements based on laboratory QC limits by analyte group.

ENSR expects that the accuracy of laboratory results will be assessed for compliance with the criteria established below using the analytical results of method blanks, trip blanks, equipment blanks, and MS/MSD samples. The percent recovery (%R) of matrix spike samples will be calculated using the following equation:

$$\% R = \frac{(A - B)}{C} \times 100$$

where A = the analyte concentration determined experimentally from the spiked sample,
B = the background level determined by a separate analysis of the unspiked sample,
and C = the amount of the spike added.

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According to the [USEPA SW-846 Manual](#) issued in 1996, the following “general rules” regarding %R “should be used as a guide for evaluating in-house performance”:

Volatile Organic Compounds, Base Neutral Compounds, and PCBs (Method 8000B): 70-130%

Metals (Method 6010B): 75-125%

Please consult the [USEPA SW-847 Manual](#) for a more detailed review of %R calculations by EPA method and analyte.

11.2.2.3 Field accuracy objectives

The achievement of accurate data in the field will be address through the use of sampling procedures that minimize bias, the calibration of field instruments, and adherence to sample holding times and preservation requirements. Accuracy in the field will be evaluated through the use of trip blanks and equipment blanks. These blanks should contain no target analytes. Accuracy will also be evaluated through the analysis of matrix spikes for samples analyzed by the Field GC.

11.2.2.4 Laboratory accuracy objectives

Laboratory accuracy will be expressed as percent recoveries and will be determined through the analysis of matrix spikes, surrogates, and laboratory control samples. Accuracy control limits are given in laboratory SOPs.

11.2.3 Completeness

11.2.3.1 Definition

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. “Normal conditions” are defined as the conditions expected if the sampling plan were implemented as planned.

11.2.3.2 Measurement of completeness

ENSR has contracted NJDEP-certified laboratories, STL-Edison and Accutest Laboratories, to perform all laboratory analysis of soil and groundwater sampling performed by ENSR at the former Ingersoll Rand Phillipsburg facility.

ENSR expects that the completeness of laboratory analytical results will be assessed by the laboratory for the amount of data required below. The completeness will be calculated using the following equation.

$$Completeness = \frac{ValidDataObtained}{TotalPlannedData} \times 100$$

11.2.3.3 Field completeness objectives

Field completeness will be measured on the basis of (1) the number of valid field measurements and (2) the number of valid samples collected. The equation for completeness is presented in Section 11.2.3.2 of this

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QAPP. The objective for field completeness for this former Ingersoll Rand Phillipsburg facility project is greater than 90%.

11.2.3.4 Laboratory completeness objectives

Laboratory completeness will be measured by the number of valid measurements obtained compared to the number of valid samples submitted. The equation for calculating completeness is presented in Section 11.2.3.2 of this QAPP. The completeness objective for the laboratory is greater than 90%.

11.2.4 Sensitivity

ENSR has contracted NJDEP-certified laboratories, STL-Edison and Accutest Laboratories, to perform all laboratory analysis of soil and groundwater sampling performed by ENSR at the former Ingersoll Rand Phillipsburg facility.

ENSR expects that the laboratory will monitor the data quality through constant instrument performance and that instrument sensitivity will be monitored through the use of method blanks, calibration check samples, etc., in accordance with the methods listed in [Table 1](#) of this QAPP. Method detection limits will be calculated according to [40 CFR Part 136 Appendix B](#).

11.3 Representativeness

11.3.1 Definition

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition.

11.3.2 Measures to ensure representativeness of field and laboratory data

Representativeness is a qualitative parameter which is dependent upon the proper design of the sampling program and proper laboratory protocol. The rationale of the sampling program is discussed in the Work Plan. Representativeness will be satisfied by ensuring that the Work Plan is followed, proper sampling techniques are used, samples are appropriately preserved, proper analytical procedures are followed, and holding times of the samples are not exceeded.

11.4 Comparability

11.4.1 Definition

Comparability expresses the confidence with which one data set can be compared to another.

11.4.2 Measures to ensure comparability of field and laboratory data

The extent to which existing and planned analytical data will be comparable depends on the similarity of sampling and analytical methods. The procedures used to obtain the planned analytical data, as documented in this QAPP, are expected to provide comparable data. Any changes in procedure or QA objectives may affect data comparability.

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For the former Ingersoll Rand Phillipsburg facility field investigation, comparability will be maximized by: (1) the use of SOPs throughout the project; (2) the recording of data in a standardized format; (3) the use of standard EPA methods; (4) conducting confirmatory sampling and analysis when using alternative sampling and analysis methodologies; and (5) reporting of data in appropriate, consistent units.

11.5 Level of Quality Control effort

11.5.1 Field measurement

Field blank, trip blank, method blank, standard reference materials (SRM), and matrix spike samples will be analyzed to assess the accuracy of the data resulting from the field sampling and analytical programs. Duplicate samples will be taken and analyzed to evaluate the precision.

The QC level of effort for the field measurement of water quality parameters, VOCs in well headspace, and geophysical parameters will include pre-operational calibrations, daily calibration checks, and consistent measurements. The types of instruments that may be used to perform these measurements are identified in Section 6.4 of this QAPP. Initial calibrations and routine checks will be performed in accordance with ENSR SOPs, manufacturer's recommendations, and/or with Section 6.4 of this QAPP. Water quality measurements must agree to the following specifications for low flow sampling:

Temperature	± 3%
pH	± 0.1 standard unit
Specific Conductivity	± 3%
Turbidity	± 10%
Dissolved Oxygen (DO)	± 10%

Field blanks are analyzed to check for procedural contamination at the site that may cause sample contamination. Equipment blanks will be prepared by routing deionized/distilled water through sampling equipment after equipment decontamination and before field sample collection. Field blanks will be collected and analyzed for all target parameters at a frequency of one for every 20 investigative samples or at least one per day.

Trip blanks are used to assess the potential for contamination of samples due to VOC contaminant migration during sample shipment and storage. The laboratory prepares trip blanks by filling sets of 40-ml vials with deionized/distilled water, sealing the vials with septum-lined caps (allowing no headspace), and keeping them with the sample cooler from the time the sampling kit leaves the laboratory until it is returned from the field. Trip blanks will be required at a frequency of one set per cooler in which VOC samples are shipped. Trip blanks will be analyzed for VOCs.

Field duplicates are analyzed to check for sampling and analytical reproducibility. Duplicate samples will be collected by alternately filling sample bottles from the source being sampled. One field duplicate will be collected for every 20 investigative samples.

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Matrix spikes provide information about the effect of the sample matrix on the preparation and measurement methodology. Matrix spikes for organic and inorganic analyses are performed in duplicate and are hereinafter referred to as MS/MSD samples. MS/MSD samples will be prepared by the laboratory according to their SOPs. A laboratory duplicate analysis will be performed for inorganic parameters at the same frequency as the MS/MSD.

Method blanks are generated within the laboratory and are used to assess contamination resulting from laboratory procedures. The frequency of method blanks is dependent on the method. For organic analyses, one method blank will be analyzed for every 20 samples or for every extraction batch of samples, whichever is more frequent. For inorganic analyses, one method blank per batch of samples processed at the same time will be analyzed.

11.5.1.2 Laboratory analysis

The level of QC effort provided by the laboratory will be equivalent to the level of QC effort required under the methodologies specified in Sections 9 and 10 of this QAPP.

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12.0 Performance and system audits

A system audit is defined as a qualitative evaluation of the components of a measurement system to determine their proper selection and use. A performance audit is a quantitative evaluation of the measurement system that requires testing of the system with samples of known composition or behavior to evaluate precision and accuracy.

12.1 Field audits

12.1.1 Field performance audits

It will be the responsibility of the appropriate ENSR Task Manager to continually monitor the performance of the field team, including subcontractors, for conformance to the task's work plan and the QAPP. Any major problems or deficiencies will be communicated to the Project Manager and Quality AAM. A record of any problems encountered, and their resolution, will be maintained in the field notebook.

Field performance will also be evaluated based on the analytical results of the equipment blanks and field duplicates with the help of the ENSR Database Manager. Equipment blanks assess the effectiveness of measures taken in the field to minimize cross contamination. The results of field duplicates reflect the ability of the field team to collect representative sample portions of each matrix type.

12.1.2 Field system audits

Internal audits of field activities will be conducted every two months by a designated ENSR Task Manager(s) and ENSR QAM during the field sampling program. Follow-up audits will be conducted if serious problems are encountered.

The audits will cover the execution of sample identification, sample control, chain-of-custody procedures, field sampling and documentation, compliance with QA/QC objectives, and general compliance with the SOW. The audits will involve a review of field logbooks and standard forms, chain-of-custody records, and instrument calibration records. The QAM will review field performance with the Task Manager(s).

During the field performance audit, the designated Task Manager will maintain a record of the audit with written field notes. Preliminary results of the audit will be reviewed with the QAM. Corrective action for deficiencies that adversely affect the quality of the data will be implemented immediately.

Upon completion of the audit, the QAM will develop an audit report in the form of a memorandum that summarizes the audit findings and identifies those areas still requiring corrective measures. This report will be submitted in memorandum form to the ENSR Project Manager and to the project file. The resolution of final action as described in Section 14 of the QAPP will be subsequently implemented.

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12.1.3 Project audit

Once every two months, beginning in February 2006, the QAM will perform a Project Audit. The Project Audit will include:

- An interview with the Database and GIS Manager to review data management and database audit results.
- A review of computer and hard copy file management and problems encountered.
- Review field book inventory and field book revisions.
- Interview with Task Managers and the Environmental Compliance Coordinator. The QAM will summarize problems detected during field documentation, field activities, and field performance audits, as well as actions taken and/or recommended.
- The Project Audit will be documented through the use of the Project Quality Assurance Audit Form included in Appendix A.
- Project QA Report to Management. Based on the Project Audit, the Project QA officer will write a monthly Project QA Report to management.

The QAM will schedule quarterly Quality Assurance Project Audit Reviews with the Quality Management Steering Committee. Sections 2, 14, and 15 detail the objectives of the quarterly review. The Quarterly Reviews shall be documented on the form provided in Appendix A of the QAPP.

12.2 Laboratory audits

12.2.1 Laboratory performance Audits

ENSR has contracted NJDEP-certified laboratories, STL-Edison and Accutest Laboratories, to perform all laboratory analysis of soil and groundwater sampling performed by ENSR at the former Ingersoll Rand Phillipsburg facility. ENSR does not perform on-site audits of laboratory procedures; however ENSR expects that the laboratory will conduct regular audits of facilities, processes, and procedures according to written protocols established by the laboratory QA Program. These audits will be conducted by the laboratory's QA Officer and the results documented in the laboratory analytical reports.

12.2.2 Laboratory system audits

An on-site audit of the laboratory will not be conducted by ENSR as part of the soil, groundwater, and/or remedial investigations and activities. However, laboratories will be selected based on reputation and quality of work product previously provided to ENSR. ENSR will monitor Laboratory activities such as timely receipt of analytical results, QA/QC procedures and data, electronic data deliverable (EDD) submissions, etc. If and any time, laboratory activities consistently do not meet project QA/QC objectives, ENSR may subcontract the services of alternate laboratory(ies).

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13.0 Preventive maintenance

13.1 Field instruments

Preventive maintenance for all field instruments will be conducted according to applicable manufacturer's instructions, NJDEP guidance, and ENSR SOPs. A representative log for maintenance of field instruments is included in Appendix A.

Instrument instruction manuals will be available on site. Critical spare parts such as lamps, probes, and battery chargers will be kept on site to minimize downtime.

13.2 Laboratory instruments

ENSR has contracted NJDEP-certified laboratories, STL-Edison and Accutest Laboratories, to perform all laboratory analysis of soil and groundwater sampling performed by ENSR at the former Ingersoll Rand Phillipsburg facility. ENSR expects that these laboratories will conduct preventative maintenance routinely on each analytical instrument, and that analytical instruments will be maintained and serviced in accordance with the manufacturer's specifications, laboratory SOPs, and analytical methods.

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14.0 Corrective actions

Corrective action is the process of identifying, recommending, approving, and implementing measures to counter unacceptable procedures or out-of-limit QC performance that can affect data quality. Corrective action can occur during data compilation, data import, data validation, and data assessment. Any nonconformance with the established QC procedures in the QAPP will be identified and corrected in accordance with the QAPP. All corrective action proposed and implemented will be documented in the QA sections of project deliverables. The following procedures should be followed when problems are identified and corrective actions are taken:

The person who identifies the problem is responsible for notifying the ENSR Project Manager, relevant Task Manager, and QAM.

- Corrective action should only be implemented after approval by the ENSR Project Manager, or his designee (generally the Task Manager).
- If immediate corrective action is required, approvals secured by telephone from the ENSR Project Manager should be documented in an additional memorandum.
- For other noncompliance problems, a formal corrective action program will be determined and implemented at the time the problem is identified.

The ENSR Task Manager, or his designee, will issue a nonconformance/corrective action memorandum for each nonconforming condition.

Corrective actions are defined as those measures taken to rectify a laboratory or field measurement system that exceeds its control limits. These actions may be initiated by any person performing work in support of the former Ingersoll Rand Phillipsburg facility field investigation. The need for corrective action may be identified by system or performance audits or by standard QC checks. The essential steps in the corrective action process are:

- identifying and defining the problem;
- assigning responsibility for investigating the problem;
- investigating and determining the cause of the problem;
- determining a corrective action to eliminate the problem;
- assigning and accepting responsibility for implementing the corrective action;
- implementing the corrective action and evaluating its effectiveness; and
- verifying that the corrective action has eliminated the problem.

14.1 Sample collection/field Measurements

Corrective action in the field can be needed when:

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- the sample network is changed (i.e., more/less samples, sampling locations other than those specified in this QAPP, etc.);
- sampling procedures and/or field analytical procedures require modification, etc. due to unexpected conditions; or
- the integrity of field measurements or samples is in question.

The field team members will be responsible for identifying any suspected technical or QA deficiencies and reporting them to their assigned Task Manager. The ENSR Task Manager will be responsible for assessing the suspected deficiency, for determining the impact on the quality of the data (in consultation with the ENSR QAM and Project Manager), developing the appropriate corrective action, and ensuring it is implemented. Corrective actions will be reviewed during the quarterly Quality Management Steering Committee review.

If the corrective action augments the original scope of the sampling plan (i.e., increases the numbers or types of samples/analyses) and uses existing and approved procedures in this QAPP, approval by the ENSR Task Manager and ENSR Project Manager will be sufficient. If the corrective action results in a reduced scope of the work, significant alterations in sample location, major modifications to analytical methods, or causes the project data quality objectives not to be achieved, it will be necessary for all levels of project management to concur with the proposed action.

If problems with field measurements occur, corrective action may include:

- repeating the measurement to check the error;
- checking for all proper adjustments for ambient conditions such as temperature;
- checking the batteries;
- recalibrating equipment;
- checking the calibration;
- replacing the instrument or piece of equipment; or
- stopping work.

If, during his/her review of sampling operations, the ENSR Task Manager determines that the integrity or quality of the sample(s) has been adversely affected, the following corrective measures may be implemented:

- reviewing sampling and/or chain-of-custody procedures and modifying as necessary;
- replacing or repairing sampling equipment;
- collecting replacement sample(s); or
- stopping work.

Deficiencies may also be noted during internal field audits performed by the assigned Task Manager(s). The Task Manager(s) will identify the deficiencies and recommend the appropriate corrective action to the ENSR Project Manager and the QAM. Upon approval by the ENSR Project Manager, the ENSR Task Manager and field team members will be responsible for implementing the corrective action. If the use of unapproved

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methods, or the improper use of approved methods, is adversely affecting the data, corrective action may be implemented immediately.

Corrective actions will be documented in the field records. Documentation will include:

- a description of the circumstance that initiated the corrective action;
- the action taken in response;
- the final resolution; and
- any necessary approvals.

Corrective action resulting from internal field audits will be documented in the Project Audit reports to management. No staff member will initiate corrective action without prior communication of findings through the proper channels.

14.2 Laboratory analyses

Laboratory personnel will be alerted that corrective actions may be necessary if:

- QC data are outside the warning or acceptable windows for precision and accuracy;
- blanks contain target analytes above acceptable levels;
- undesirable trends are detected in spike recoveries or RPD between duplicates;
- there are unusual changes in detection limits;
- deficiencies are detected by the QA department during internal or external audits or from the results of performance evaluation samples; or
- inquiries concerning data quality are received.

ENSR contracts all laboratory analytical work for the former Ingersoll Rand Phillipsburg facility project with NJDEP-certified laboratories. ENSR expects that the need for most corrective actions will be identified by the laboratory. Corrective action procedures may be handled at the bench level by the analyst, who will review the preparation or extraction procedure for possible errors, check the instrument calibration, spike and calibration mixes, instrument sensitivity, and so on. Corrective action will be in accordance with method protocol (when applicable). If the problem persists or cannot be identified, the matter will be referred to the laboratory supervisor, manager and/or QA department for further investigation. Once resolved, full documentation of the corrective action procedure, including approval by the appropriate management representative, will be filed with the laboratory QA department.

Specific corrective measures pertaining to field duplicates and sample loss or breakage are discussed below.

Field Duplicates

The field duplicate criteria for data validity are defined in Section 11 and [Table 1](#) of the QAPP. If the field duplicate criteria are not met, the field sampling log book will be examined for any physical/mechanical differences noted during sampling which would explain the discrepancy.

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Samples

If insufficient sample volume for analysis remains after shipment and storage, the ENSR Task Manager will be notified by the Laboratory Project Manager. The ENSR Project Manager will determine if another sample will be collected and shipped to the laboratory for analysis. The analysis report for the sample batch containing the affected sample will clearly note in the discussion section that a replacement sample was taken. The ENSR Field Operations Task Manager will notify the ENSR Quality Assurance Manager of the problem and subsequent resolution.

Sample extract

If a sample extract is broken or lost during analysis, the ENSR Assistant Project Manager will be notified by the Laboratory's Project Manager. ENSR Assistant Project Manager will notify the Quality Assurance Manager. Another sample may be collected and shipped to the laboratory for analysis, if necessary, depending upon the data completeness requirements for the specific sample type, and with the approval of the ENSR Project Manager. The analysis report for the sample batch containing the affected sample will clearly note in the discussion section that a replacement sample was taken.

Quality Control samples

If a QC sample is lost or broken during analysis, the ENSR Assistant Project Manager will be notified by the Laboratory's Project Manager. ENSR Assistant Project Manager will notify the Quality Assurance Manager. If necessary, a replacement QC sample may be sampled and analyzed depending on the type of sample and with the approval of the ENSR Project Manager. The analysis report for the sample batch associated with the QC sample will clearly note in the discussion section why the data is unavailable or if a replacement sample was analyzed.

14.3 Data validation/Data assessment

The need for corrective action may be identified during either data validation or data assessment. Potential types of corrective action may include resampling by the field team or reinjection/reanalysis of samples by the laboratory. These actions are dependent upon the ability to mobilize the field team, whether the data to be collected are necessary to meet the required QA objectives, and physical limitations on the ability to recollect or reanalyze the sample.

The need for corrective action may be identified by the data validator or by a member of the project team assessing the data. The person responsible for identifying the corrective action situation will notify the ENSR Project Manager, who will be responsible for approving implementation of the corrective action. All corrective actions of this type will be documented by the ENSR QAM in the Project Quality Assurance audit reports (Section 15 of this QAPP).

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15.0 Quality Assurance reports to management

As part of the requirements of each member of the project team, notification will be submitted to the ENSR QAM to ensure that any problems identified during the sampling and analysis programs are investigated and the proper corrective measures taken in response. The Field Operation Task Managers will assist the QAM in preparing the Project Quality Assurance Audit every two months (beginning in February 2006). The audit will include:

- summary of the status of field activities, including compiled field data sets and the results of field audits (Section s 9, 10, and 12 of this QAPP);
- periodic assessment of measurement data accuracy, precision, and completeness (Section 11 of this QAPP);
- summary of the status of laboratory activities, including timely submittal of analytical results, and compilation of QC data (Sections 10 and 11 of this QAPP); and
- any other QA issues relevant to the project, including corrective action situations, resolutions of previously stated problems, summaries of training programs, results of any performance evaluation audits, and any minor changes to this QAPP.

The QAM will review corrective actions as part of the Project Quality Assurance Audits performed every two months. These audit reports will be prepared in writing by the ENSR QAM who will provide compilation report(s), as necessary to the ENSR Project Manager. Audit findings will be presented at quarterly Steering Committee meetings. If serious QA deficiencies are noted, supplemental reports may be submitted. The QAPP will be revised as necessary on a quarterly basis.

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16.0 References

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17.0 Tables

TABLE 1
Analytical Methods/Quality Assurance Summary Table

Analyte Group	Matrix Type	Sample # or frequency	Number of Field Blanks	Number of Trip Blanks	Analytical Method** # and type of field duplicate samples		Sample Preservation	Sample Container Volume (Minimum quantity)*	Sample Holding Time*
Volatile Organic Compounds	groundwater	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	1 per cooler	624	1 every 20 samples (any analyte)	Glass with Teflon-lined septum, store at 4°C, use H ₂ SO ₄ , HCl, or NaHSO ₄ to pH<2	2 x 40 ml	14 days
Volatile Organic Compounds	surface water	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	1 per cooler	624	1 every 20 samples (any analyte)	Glass with Teflon-lined septum, store at 4°C, use H ₂ SO ₄ , HCl, or NaHSO ₄ to pH<2	2 x 40 ml	14 days
Volatile Organic Compounds	soil	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	1 per cooler	8260B	1 every 20 samples (any analyte)	Glass with Teflon-lined septum, store at 4°C, use methanol	1 10-oz glass jar; or one 5-gram EnCore	14 days (jar); 48 hours (EnCore)
Volatile Organic Compounds	sediment	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	1 per cooler	8260B	1 every 20 samples (any analyte)	Glass with Teflon-lined septum, store at 4°C, use methanol	1 10-oz glass jar; or one 5-gram EnCore	14 days (jar); 48 hours (EnCore)
Volatile Organic Compounds	sludge	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	1 per cooler	8260B	1 every 20 samples (any analyte)	Glass with Teflon-lined septum, store at 4°C, use methanol	2 x 40 ml	14 days (jar); 48 hours (EnCore)
Volatile Organic Compounds, TCLP	soil	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	1 per cooler	-	1 every 20 samples (any analyte)	Glass with Teflon-lined septum, store at 4°C, use H ₂ SO ₄ , HCl, or NaHSO ₄ to pH<2	2 x 40 ml	14 days (extraction), 14 days (analysis)
Semivolatile Organics (BNA), Polynuclear Aromatics	groundwater	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	None	625	1 every 20 samples (any analyte)	Store at 4°C, amber glass with Teflon-lined cap	1000 ml	7 days (extraction), 40 (analyzed) days; 5 days (extraction)
Semivolatile Organics (BNA), Polynuclear Aromatics	soil	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	None	8270, 8270C	1 every 20 samples (any analyte)	Store at 4°C, amber glass with Teflon-lined cap	1000 ml	7 days (extraction), 40 (analyzed) days; 5 days (extraction)
Semivolatile Organics (BNA), Polynuclear Aromatics	sediment	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	None	8270C	1 every 20 samples (any analyte)	Store at 4°C, amber glass with Teflon-lined cap	1000 ml	7 days (extraction), 40 (analyzed) days; 5 days (extraction)
Semivolatile Organics (BNA), Polynuclear Aromatics	sludge	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	None	8270C	1 every 20 samples (any analyte)	Store at 4°C, amber glass with Teflon-lined cap	1000 ml	7 days (extraction), 40 (analyzed) days; 5 days (extraction)
Semivolatile Organics (BNA), Polynuclear Aromatics TCLP	soil	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	None	-	1 every 20 samples (any analyte)	Store at 4°C, amber glass with Teflon-lined cap	1000 ml	14 days (extraction), 7 days (from extraction to analysis) 40 days (analysis)
PP-Metals	groundwater	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	None	200.7	1 every 20 samples (any analyte)	HNO ₃ to pH<2, polyethylene or glass	500 ml	6 months
PP-Metals	soil	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	None	6010, 6010B	1 every 20 samples (any analyte)	Store at 4°C, polyethylene or glass	40 ml	6 months
PP-Metals	sediment	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	None	6010B	1 every 20 samples (any analyte)	Store at 4°C, polyethylene or glass	40 ml	6 months
PP-Metals	sludge	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	None	6010B	1 every 20 samples (any analyte)	Store at 4°C, polyethylene or glass	40 ml	6 months
Metals TCLP	soil	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	None	-	1 every 20 samples (any analyte)	Store at 4°C, polyethylene or glass	40 ml	180 days (extraction), 180 days (holding)
Cyanide	soil	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	None	9012, 9012A	1 every 20 samples (any analyte)	Chilled to 4°, ascorbic acid, NaOH to pH >12	1000 ml	14 days
Cyanide	sediment	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	None	-	1 every 20 samples (any analyte)	Chilled to 4°, ascorbic acid, NaOH to pH >12	1000 ml	14 days
Mercury	groundwater	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	None	245.1	1 every 20 samples (any analyte)	HNO ₃ to pH<2, polyethylene or glass	500 ml	28 days
Mercury	soil	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	None	7471A, 7470B	1 every 20 samples (any analyte)	HNO ₃ to pH<2, polyethylene or glass	500 ml	28 days
Mercury	sediment	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	None	7471A	1 every 20 samples (any analyte)	HNO ₃ to pH<2, polyethylene or glass	500 ml	28 days
Mercury	sludge	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	None	7471A	1 every 20 samples (any analyte)	HNO ₃ to pH<2, polyethylene or glass	500 ml	28 days

TABLE 1
Analytical Methods/Quality Assurance Summary Table

Analyte Group	Matrix Type	Sample # or frequency	Number of Field Blanks	Number of Trip Blanks	Analytical Method** # and type of field duplicate samples		Sample Preservation	Sample Container Volume (Minimum quantity)*	Sample Holding Time*
Mercury TCLP	soil	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	None	-	1 every 20 samples (any analyte)	HNO ₃ to pH<2, polyethylene or glass	500 ml	28 days (extraction), 28 days (analysis)
Chromium (hexavalent)	soil	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	None	218.4, 7195, 7196, 7197, 7198, 7199	1 every 20 samples (any analyte)	Store at 4°, polyethylene or glass	250 ml	24 hours
Pesticides and PCBs	groundwater	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	None	608	1 every 20 samples (any analyte)	Store at 4°, amber Glass with Teflon-lined Cap	1000 ml	7 days (extraction), 40 (analyzed) days
Pesticides and PCBs	soil	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	None	8081, 8082	1 every 20 samples (any analyte)	Store at 4°, amber Glass with Teflon-lined Cap	1000 ml	7 days (extraction), 40 (analyzed) days
Pesticides and PCBs	sediment	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	None	8081, 8082	1 every 20 samples (any analyte)	Store at 4°, amber Glass with Teflon-lined Cap	1000 ml	7 days (extraction), 40 (analyzed) days
Pesticides and PCBs	sludge	as required by the RAW	1 every 20 samples (any analyte), or 1 per day	None	8081, 8082	1 every 20 samples (any analyte)	Store at 4°, amber Glass with Teflon-lined Cap	1000 ml	7 days (extraction), 40 (analyzed) days
* Based on STL Sample Handling Guide and NJDEP Field Sampling Procedures Manual (August 2005);									
**Those methods appearing in the ENSR database.									
Note: Matrix spike and matrix spike duplicate samples are prepared by the laboratory. Spike sample recovery, method blank, surrogate recovery compound analysis Split samples are not collected for this project and performance evaluation samples are not analyzed for this project.									
Source: STL Sampling Handling Guide, NJDEP Field Sampling Procedures Manual (August 2005).									

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18.0 Appendices

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Appendix A - Forms

This Appendix A includes the following forms:

- Subcontractor Evaluation Form
- QA Checklist: Figures
- QA Checklist: Tables
- Detailed QA Checklist: Tables: Layout QA
- Detailed QA Checklist: Tables: Layout QA
- Detailed QA Checklist: Tables: First QA
- Detailed QA Checklist: Tables: Second QA
- Detailed QA Checklist: Tables: Final QA
- Detailed QA Checklist: Tables: Status
- Detailed QA Checklist: Matching CADD Tables and Figures
- QA Checklist: Database Audit: Missing Analyte Table
- QA Checklist: Database Audit: dt_result
- QA Checklist: Database Audit: Summary Tables
- Project Quality Assurance Audit Form & Quarterly Quality Assurance Project Audit Form
- Field Instrument Maintenance Form
- PID Meter Calibration Form

ENSR

Former IR Facility-Phillipsburg, NJ

Project Name:_____

Project No. _____

[illegible]

SUBCONTRACTOR SELECTION FORM



Project: _____
Task: _____
Description of Work: _____

Tentative Schedule for Activities: _____

CONTRACTOR 1: _____

CONTRACTOR 2: _____

CONTRACTOR 3: _____

Selected Contractor: _____

Reasons for Selection:

- | | |
|---|---|
| <input type="checkbox"/> Price | <input type="checkbox"/> Knowledge of Site |
| <input type="checkbox"/> Availability | <input type="checkbox"/> Quality of Previous Work |
| <input type="checkbox"/> Understanding of SOW | <input type="checkbox"/> Health and Safety Record |
| <input type="checkbox"/> Uses IR Equipment | <input type="checkbox"/> Other (describe below) |

Other: _____

QA CHECKLIST
FIGURES

	VOC		TPHC		Metals		PCBs		BN	
	fig	CADD table	fig	CADD table	fig	CADD table	fig	CADD table	fig	CADD table
Additions										
pending										
missing										
(brackets)										
sample ID sort										
center all except Location ID										
†										
.x > 0.x										
input QA rev										
corrected sample IDs to match Results Tables										
submit to Joan for table import										
Table import complete										
Notes import										
Notes import complete										
bold match color code for NJDEP										
2nd level QA (for 7/1)										
final CADD table on fig (check with CADD files)										
notes										
titles										
sheet #'s										
pdf.										
Misc										
Last Updated:										

QA CHECKLIST
TABLES

	Sample Summary	TPHC		VOC		BN		PCBs		Metals		QA/QC	CAD
Table #	2	4 Results	B2A Deed	5 Results	B2B Deed	6 Results	B2C Deed	7 Results	B2D Deed	8 Results	B2E Deed	9	
Additions													
pending													
missing													
_.x > 0.x													
‡													
Pg Setup													
notes													
margins													
titles													
footer													
page breaks													
page #'s													
Cosmetics													
(brackets)													
decimal value													
pdf.													
To Do													

Misc.

Notes

PCB report - bold individual Aroclors

Reminders

etc. ? ? ?

QA CHECKLIST
TABLES: LAYOUT QA

Layout includes QA of the following:	
Analytes	<p>compile total of analytes across all time periods for each analyte group (VOC, BN, Metal, PCB, TPHC).</p> <p>check with Andrea which analytes can be removed, which should be added across all time periods.</p> <p>update total of analytes and match across all time periods</p> <p>For deed tables: delete whole row of those analytes that have NO exceeding value (not bolded values);</p> <p>For cad tables: delete whole row of those analytes that have NO exceeding value (not bolded values) plus those that show an exceeding value for undetected results (values bolded with qualifier 'U').</p>
Notes	<p>compile all qualifiers that appear across all time periods.</p> <p>lookup qualifier description in the lookupData folder (labQualifiers.doc and Appendic_C.doc).</p> <p>word according to other description.</p> <p>match across all time periods.</p>
Bold exceeding values	<p>Use conditional formatting 1 (for positive results) and 2 (for negative results); see lookupData folder formula.txt for formulas; bold values equal or greater than the standard, including those values that are marked undetected. For PCB deed and result table only: bold individual Aroclors as well as total Aroclor. For Cad table only bold the detected values.</p> <p>verify bolding against 'flag' 'x'.</p>
Page Setup	<p>verify header/footer against headerFooter.txt in dataLookup folder.</p> <p>verify page setup against Table Formatting.doc in dataLookup folder.</p>
Sorting	<p>verify 1st sort is by Date then by Sample ID for deed and result table; cad tables 1st sort is by Sample ID then by Date. (This can change per report; so verify with Andrea).</p>

QA CHECKLIST
TABLES: FIRST QA

1st QA includes the following:	
Analytes	Are the same analytes listed across the table the same?
Notes	Are all qualifiers listed in the notes? Are they worded correctly? Are they the same across the table?
Bold exceeding values	Are all values that exceed the MSSCC bolded (including values in brackets) for the result and deed tables? For cad tables, are only exceeding values bolded? For PCB deed and result table only: are individual Aroclor values bolded as well as total Aroclor?
Page Setup	Is page setup consistent across the table?
Sorting	1st sort by Date then by Sample ID for deed and result table; cad tables 1st sorted by Sample ID then by Date. (This can change per report; so verify with Andrea)
Samples	Are all samples for Lot 7.03 listed in this table? Use November 2004 Soil RI report to verify for historic data; use Table 2 and sample location map for recent data.

If needed QA can be split up and handed to two different people by color code:
elements regarding layout
elements regarding content

QA CHECKLIST
TABLES: SECOND QA

2st QA includes the following:	
Analytes	Are the same analytes listed across the table the same?
Notes	Are all qualifiers listed in the notes? Are they worded correctly? Are they the same across the table?
Bold exceeding values	Are all values that exceed the MSSCC bolded (including values in brackets) for the result and deed tables? For cad tables, are only exceeding values bolded? For PCB deed and result table only: are individual Aroclor values bolded as well as total Aroclor?
Page Setup	Is page setup consistent across the table?
Samples	Are all samples for Lot 7.03 listed in this table? Use November 2004 Soil RI report to verify for historic data; use Table 2 and sample location map for recent data.
	Verify samples are reported consistently across deed, result and cad tables.

If needed QA can be split up and handed to two different people by color code:

- elements regarding layout
- elements regarding content

QA CHECKLIST
TABLES: FINAL QA

Analytes	
Notes	Remove from notes the lines tha are not needed anymore (such as for pending data) Check if notes come through on following pages (change column width; row height)
Depth	Check if depth values have 0.N instead of .N (so depth between 0 - .5 should read 0 - 0.5)
Bold exceeding values	
Final QA includes the following:	
Analytes	Are the same analytes listed across the table the same?
Notes	Are all qualifiers listed in the notes? Are they worded correctly? Are they the same across the table?
Bold exceeding values	Are all values that exceed the MSSCC bolded (including values in brackets) for the result and deed tables? For cad tables, are only exceeding values bolded? For PCB deed and result table only: are individual Aroclor values bolded as well as total Aroclor?
Page Setup	Check page break; should have at least 3 not more than 5 samples on eone page
	Check page numbering across all time periods
	Check Header: result files → TABLE; deed files -> Exhibit B-2-; see headerFooter.txt for spelling
Samples	Verify samples are reported consistently across deed, result and cad tables.

If needed QA can be split up and handed to two different people by color code:

- elements regarding layout
- elements regarding content

QA CHECKLIST
TABLES: STATUS

No. in Report ¹	Table Referred to As	File Name	Raw Table Created	Table Assigned To	Layout QA	1st QA	1st QA Assigned To	1st Edits	2nd QA ²	2nd QA Assigned To	2nd Edits	Final QA	Final Edits	Comment
4														
5														
6														
7														
8														
B2A														
B2B														
B2C														
B2D														
B2E														
Fig4														
Fig5														
Fig6														
Fig7														
Fig8														
9A														
9B														
9C														
9D														
9E														
2														
E														
D														
A														
C														
1														
3														

Note:

QA CHECKLIST MATCHING CADD TABLES AND FIGURES

[illegible]

QA CHECKLIST

DATABASE AUDIT: MISSING ANALYTE TABLE

[illegible]

QA CHECKLIST
DATABASE AUDIT: DT_RESULT

Field	Comment	error_fix_query name	error_fix_query name/notes
result_value result_type_code detect_flag organic_yn interpreted_qualifer method_detection_limit reporting_detection_limit quantitation_limit detection_limit_units result_unit			

QA CHECKLIST
DATABASE AUDIT: SUMMARY TABLES

Table	Data?	Comment
dt_lab_sample		
dt_labSDG		
dt_other_areas		
dt_phase		
dt_planned_test		
dt_product_thickness		
dt_project		
dt_pump_rate		
dt_purge		
dt_sample_parameter		
dt_site_boundary		
dt_site_loc		
dt_soil_gas_survey		
dt_task		
dt_test_batch		
dt_test_batch_assign		
dt_water_level		
dt_well		
dt_well_datum		
dt_well_development		
dt_well_segment		
rt_agency		
rt_analyte_detail		
rt_basin		
rt_client		
rt_coord_geometric_type		
rt_coord_verification		
rt_custom		
rt_equipment		
rt_equipment_type		
rt_field_param_type		
rt_file_type		
rt_geologic_unit		
rt_group		
rt_group_member		
rt_header		
rt_medium		
rt_param_type		
rt_prep_mthd_var		
rt_site_type		
rt_soil_gas_param_type		
rt_std_prep_method		
rt_symbol		
rt_test_type		
rt_well_segment_type		

QA CHECKLIST
DATABASE AUDIT: SUMMARY TABLES

Table	Data?	Comment
dt_action_level		
dt_field_sample		
dt_loc_action_level		
dt_location		
dt_result		
dt_sample		
dt_site		
dt_site_old		
dt_test		
rt_action_level_type		
rt_action_level_type_old		
rt_analyte		
rt_analyte_old		
rt_anl_mthd_var		
rt_coord_elev_datum		
rt_coord_elev_method		
rt_coord_horz_datum		
rt_coord_horz_method		
rt_coord_type		
rt_group_type		
rt_lookup		
rt_matrix		
rt_mth_anl_group		
rt_mth_anl_group_member		
rt_qualifier		
rt_qualifier_old		
rt_result_type		
rt_sample_type		
rt_std_analytic_method		
rt_subcontractor		
rt_test_batch_type		
rt_unit		
rt_unit_conversion_factor		
rt_valid_code		
dt_alternate position		
dt_aquifer_test		
dt_biological_result		
dt_bore		
dt_bore_interval		
dt_bore_reading		
dt_bore_segment		
dt_chain_of_custody		
dt_collect_proc		
dt_excavation		
dt_field_parameter		
dt_fieldqc_batch_partner		
dt_file		
dt_hydro_par		

Main Field Documentation	COCs – quality?	
	COCs – file complete and filed appropriately?	
	Boring logs - file complete and filed appropriately?	
	Well gauging logs – file complete and filed appropriately?	
	H&S documentation - file complete and filed appropriately?	
	Data management (digital) – rationally filed, problems experienced	
	Data management (hard copy) – filing system rationally organized, problems experienced, gaps, actual file status v. file index	
Other Documents maintained per QAPP (location and completeness)	geological/soil boring logs	
	well construction logs	
	well development logs	
	groundwater purge and sample logs	
	water level and product thickness records	
	environmental sample logs	
	photographic log	
	data validation logs	
	instrument calibration records	
	nonconformance/corrective action logs/memos	
	sampling memos	
	internal SPCC weekly inspection forms	
	internal monthly Class IIA landfill inspection forms	
	monthly NJPDES DSNOO2A sampling and acute toxicity sampling (Jan-Mar 2005; Oct-Dec 2005) forms	
	monthly water allocation permit measurements	
	Landfill escrow reports	
	Other Documents maintained per CAP (list to be completed once CAP is finalized)	



Project Quality Assurance Audit Form

Project #	Client
Audit Date	Auditor

TOPIC	Subtopic	Comment
<u>QA Process</u>	Field Documentation Review: What were the main issues revealed during the QA? Is the QA complete for each entry?	
	Overall QA Procedure: Problems/comments re: collection of field documentation, QA, and revisions	
<u>Field Performance</u>	TM Field Performance Review/Audits: Summary of Interview Field TMs weekly to determine the quality of performance of field staff, problems detected during field documentation and field performance audits, and actions taken and/or recommended	
	Health and Safety (H&S): Summary of issues and/or incidents;	
<u>Record Keeping</u>	Describe filing location, completeness, and process for each of the below:	
Field Books	Inventory recently revised (within week) and complete?	
	Inventory includes historical field books?	
	QA of field books up to date?	
	Field books numbered?	
	In the file with a complete file copy?	
	TOCs complete for easy reference?	
Field Book Contents	Clear and appropriately indicated authorship	
	Health and Safety summaries included	
	Correspond with COCs	
	Correspond with sampling plans	
	Appropriate and complete referencing of TM conversation and documentation in entries	
	Contain boring logs and other measurements appropriately	
	Clear scope of work/purpose indicated	
	Appropriate indication of errors and revisions	
	Routine procedures indicated (calibration, decontamination)	

Date of Next Quarterly Review (June, September, December, March)	
--	--

Signatures

Project Manager: _____

QAM: _____

Assistant Project Manager: _____

Database & GIS Manager: _____

Have any areas of non-conformance been identified (e.g., training, documentation, task implementation, etc.)	
Have QAPP Protocols resulted in enhanced performance or value added to this project?	
Have changes that result in process improvement been identified and documented?	
Have corrective actions and preventive measures been implemented as a result of non-compliance?	
Are corrective actions effective and appropriate?	
Have areas of QAPP improvement been identified?	

QUARTERLY QUALITY ASSURANCE PROJECT AUDIT REVIEW

Date	
Attendees	
Review Parameter	Discussion/Findings/Decisions
Have QAPP changes been reviewed?	
Are QA standards and targets being met for this project?	
Does the QAPP enable meeting ENSR QA standards?	

Ingersoll-Rand Maintenance Form for Field Instruments

[illegible]

Project Name: _____
Project No. _____

Date & Time	Ambient Temp	Calibration Gas	Zero reading	Cal'ed Reading	Background Reading	Battery Issues or Replacement (dates)	Initials of ENSR Empl.	Comments (problems/repairs)	

Appendix N

Health and Safety Plan

Prepared for:
Ingersoll Rand
Phillipsburg, New Jersey



HEALTH AND SAFETY PLAN

Soil and Groundwater Remediation (2006)

Former Ingersoll Rand Facility

942 Memorial Highway

Phillipsburg, New Jersey

ENSR Corporation
February 2006
Document No.: 03710-173-0103

Prepared for:
Ingersoll Rand
Phillipsburg, New Jersey

HEALTH AND SAFETY PLAN

Soil and Groundwater Remediation (2006)

Former Ingersoll Rand Facility

942 Memorial Highway

Phillipsburg, New Jersey



Prepared By – John McCartney



Reviewed By

ENSR Corporation
February 2006
Document No.: 03710-173-0103

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Attachment B – Job Hazard Analysis Form

Attachment C – Pre-Entry Briefing Attendance Sheet

Attachment D – Accident Investigation Report Form

1.0 Introduction

1.1 HASP applicability

This Health and Safety Plan (HASP) has been written to comply with the requirements of the Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120). All activities covered by this HASP must be conducted in full compliance with this HASP and with all applicable federal, state, and local health and safety regulations. Personnel covered by this HASP who can not or will not comply will be excluded from site activities.

This plan will be distributed to each employee, including subcontractor personnel, involved with the soil and groundwater investigation and remediation activities as described in detail under Section 3.0 of this document. Each employee must sign a copy of the attached health and safety plan receipt and acceptance form (see Attachment A).

1.2 Prior HASPs prepared for ongoing activities at the former Ingersoll Rand Company facility-Phillipsburg

This HASP has been developed by ENSR Corporation (ENSR) to establish health and safety procedures to minimize any potential risk to ENSR and subcontractor personnel. The provisions of this plan apply to all ENSR personnel and ENSR subcontracted personnel who may potentially be exposed to safety and/or health hazards related to the soil and groundwater investigation and remediation activities at the former Ingersoll Rand Company facility located in Phillipsburg, New Jersey

This comprehensive HASP, is an updated version of the November 2004 Accelerated Soil and Groundwater Investigation and Remediation HASP and addresses the specific soil and groundwater investigations being conducted to support site development for the calendar year of 2006 (CY 2006).

Over the past years, ENSR has also prepared the following HASPs for ongoing activities being conducted at the former Ingersoll Rand Company facility in Phillipsburg, NJ:

- May 2002 Cleaning of the Oil/Water Separators Associated with Existing Groundwater Treatment System; and
- September 2004 Upgrading, Operating and Maintaining Existing Groundwater Treatment System.

The May 2002 HASP applies to the previous cleaning activities related to the oil/water separator associated with the existing groundwater treatment system. The separator system is cleaned approximately every three (3) years and involves entry into the three (3), 10,000-gallon tanks associated with the separator system. The hazards associated with this non-routine task, which include entry into confined spaces, are addressed in that particular HASP. No cleaning of the oil/water separator system is proposed for 2006, so these activities have not been included herein. In the event that a clean-out of the oil/water separator becomes necessary, the May 2002 HASP will be updated and appended to this 2006 HASP for soil and groundwater investigation and remediation.

The September 2004 HASP applies to the ongoing operations and maintenance (O&M) that ENSR has been performing on the existing groundwater treatment system. ENSR is updating this HASP for the proposed 2006 groundwater treatment system O&M operations and will append the updated O&M HASP to this 2006 HASP for soil and groundwater investigation and remediation.

Ingersoll Rand is also obligated to implement several large scope remedial projects including the closure/capping of the Old Landfill, closure of the Inverse Ponds and removal of sediment from the Spray Pond, and Cameron area remediation. These large scale remediation tasks are not addressed within this document as the final design and scope of work for each closure project has not been prepared. Ultimately, a stand-alone HASP will be prepared for each proposed closure activity.

1.3 Management of change/modification of the HASP

1.3.1 Management of change

The procedures in this HASP have been developed based on previous site investigations and the proposed scope of work for soil and groundwater investigation and remediation for CY 2006. Every effort has been made to address the chemical hazards that may be encountered during the implementation of the proposed scope of work. Similarly, this document also discusses the physical hazards associated with the proposed activities. However, unanticipated site-specific conditions or situations may occur during the implementation of this project. Also, ENSR and/or the selected contractor may elect to perform certain tasks in a manner that is different from what was originally intended due to a change in field conditions. As such, this HASP must be considered a *working document* that is subject to change to meet the needs of this dynamic, multi-faceted project.

Therefore, ENSR and/or the selected contractor will complete a Job Hazard Analysis (JHA) prior to the beginning of each phase of work to ensure that all chemical and physical hazards have been properly addressed. The use of new techniques will be reviewed and if new hazards are associated with the proposed changes, they will be documented on the JHA. An effective control measure must also be identified for each new hazard. The JHA will be reviewed by the ENSR Task Managers (TM) and the Site Safety Officer (SSO) prior to being implemented. Once approved, the JHA will be reviewed with all field staff during the daily safety meeting. A blank JHA and the Standard Operating Procedure (SOP) to complete the JHA is presented as Attachment B.

1.3.2 Modification of HASP

Should additional and significant information become available regarding potential on-site hazards, it may be necessary to modify this HASP. All proposed modifications to this HASP must be reviewed and approved by the ENSR Regional Health and Safety Manager (RHSM) before such modifications are implemented.

Any significant modifications must be incorporated into the written document as addenda and the HASP must be reissued. The ENSR Project Manager (PM) and/or designated ENSR TM will ensure that all personnel covered by this HASP receive copies of all issued addenda. Sign-off forms will accompany each addendum and must be signed by all personnel covered by the addendum. Sign-off forms will be submitted to the ENSR PM, the ENSR TM, and the SSO. Original sign-off forms will be filed at the central location. The HASP addenda should be distributed during the daily safety meeting so that they can be reviewed and discussed. Attendance forms will be collected during the meeting.

1.4 Organization/responsibilities

The implementation of health and safety at this project location will be the shared responsibility of the ENSR PM, the ENSR RHSM, the ENSR Project SSO, the ENSR TM, and all other ENSR personnel and subcontractor staff.

1.4.1 ENSR Site Safety Officer

ENSR anticipates that daily and weekly interaction with Preferred Real Estate Investments (PREI) and its consultants and contractors will be necessary as decisions are made regarding site development. Additionally with the expected volume of work proposed for completion over this phase of investigation and remediation, it will be important to have an onsite presence to assist with day-to-day activities. As such, ENSR proposes to dedicate one staff member to an onsite office in order to coordinate field activities, act as site liaison, and monitor development activities being conducted at the facility in order to keep Ingersoll Rand informed and protected from potential liability. This individual will also assist the field team as needed in relation to the proposed investigative and remedial activities for CY 2006.

All ENSR field technicians are responsible for implementing the safety requirements specified in this HASP. Due to the numerous tasks associated with this overall program, the onsite person has been designated as the ENSR SSO and will be on-site during the proposed activities for which ENSR field technicians are responsible for overseeing.

The SSO is responsible for enforcing the requirements of this HASP once work begins. The SSO has the authority to immediately correct all situations where noncompliance with this HASP is noted and to immediately stop work in cases where an immediate danger is perceived. Some of the SSO's specific responsibilities include:

- Assuring that all personnel to whom this HASP applies have submitted a completed copy of the HASP receipt and acceptance form;
- Assuring that all personnel to whom this HASP applies have attended a pre-entry briefing prior to entering an exclusion zone and any subsequent safety meetings that are conducted during the implementation of the program;
- Maintaining a high level of health and safety consciousness among employees involved with the activities covered by this HASP;
- Reviewing JHAs with the subcontractor(s) to ensure that all physical and chemical hazards not previously identified in the HASP have been adequately addressed and the measures needed to control these new hazards have been implemented;
- Procuring the air monitoring instrumentation and performing air monitoring for ENSR activities;
- Verifying that all PPE and health and safety equipment used by ENSR is in good working order;
- Verifying that the subcontractors have the required PPE available for their employees;
- Setting up and maintaining the decontamination zone and assuring proper cleanup of personnel involved with the investigation;
- Notifying the PM and/or TM of all noncompliance situations and stopping work in the event that an immediate danger situation is perceived;
- Monitoring and controlling the safety performance of all personnel within the established restricted areas to ensure that required safety and health procedures are being followed;
- Conducting accident/incident investigations and preparing accident/incident investigation reports;
- Conducting the pre-entry briefing as required by Section 10.2.1 of the HASP; and,
- Initiating emergency response procedures in accordance with Section 11.0 of this HASP.

1.4.2 ENSR Project Manager

The ENSR PM (Gregg Micalizio) is the individual who has the primary responsibility for ensuring the overall health and safety of this project. As such, the PM is responsible for ensuring that the requirements of this HASP are implemented. Some of the PM's specific responsibilities include delegating to the appropriate TM these H&S tasks, including but not limited to:

- Assuring that all ENSR personnel to whom this HASP applies have received a copy of it;
- Providing the RHSM with updated information regarding environmental conditions at the site and the scope of site work;
- Providing adequate authority and resources to the on-site SSO to allow for the successful implementation of all necessary safety procedures;
- Supporting the decisions made by the SSO and RHSM; and,
- Maintaining regular communications with the SSO, and if necessary, the RHSM.

1.4.3 ENSR Regional Health and Safety Manager

The ENSR RHSM (John McCartney) is the individual responsible for the preparation, interpretation and modification of this HASP. Modifications to this HASP which may result in less stringent precautions cannot be undertaken by the PM or the SSO without the approval of the RHSM. Specific duties of the RHSM include:

- Writing, approving and amending the HASP for this project;
- Advising the PM and SSO on matters relating to health and safety at each site;
- Recommending appropriate personal protective equipment (PPE) and air monitoring instrumentation to protect personnel from potential site hazards;
- Conducting accident investigations; and,
- Maintaining regular contact with the PM and SSO to evaluate site conditions and new information which might require modifications to the HASP.

1.4.4 ENSR field personnel and subcontractor personnel

All ENSR field personnel and subcontractor personnel covered by this HASP are responsible for following the health and safety procedures specified in this HASP and for performing their work in a safe and responsible manner. Some of the field staff's specific responsibilities include:

- Reading the HASP in its entirety prior to the start of on-site work;
- Submitting a completed HASP Acceptance Form and documentation of medical surveillance and training to the ENSR PM and the SSO prior to the start of work;
- Attending the required pre-entry briefing prior to beginning on-site work and any subsequent safety meetings that are conducted during the implementation of the program;
- Bringing forth any questions or concerns regarding the content of the HASP to the PM or the SSO prior to the start of work;
- Reporting all accidents, injuries and illnesses, regardless of their severity, to the ENSR SSO;
- Complying with the requirements of this HASP and the requests of the SSO; and
- Record periodically in the field book any H&S conditions.

1.4.5 Subcontractors

In addition to other requirements referenced in this HASP, all subcontractors are required to:

- Appoint an on-site main coordinator to interface with the ENSR SSO and field technicians;
- Notify ENSR of any tasks that involve hazards not previously identified in the HASP;
- Secure the necessary equipment to control any new hazards identified in the JHAs;
- Provide appropriate PPE and respiratory protection for their employees;
- Ensure, via daily inspections, that their equipment is maintained in good working condition; and
- Operate their equipment in a safe manner.

2.0 Site description and history

2.1 Site location

The former Ingersoll Rand Company facility is located at 942 Memorial Parkway in Phillipsburg, New Jersey. The site occupies approximately 385 acres and consists of multiple buildings, foundations of former buildings, roads and parking areas, two landfills, several ponds, landscaped areas and agricultural fields.

2.2 Site operations

Ingersoll Rand began facility construction in 1903 and underwent various expansions and additions throughout the following 70 years. According to previous reports, the facility manufactured products such as pumps, turbo equipment, air and gas compressors, hammer and rock drills, and mining equipment. The facility also maintained an active iron and steel foundry on site, which was operated to process the raw materials for manufacturing operations. Subsequent restructuring activities resulted in closing or moving of almost all of these operations. Since the 1980s, production activities at the site have declined due to consolidation of operations, the sale of the Dresser-Rand pump manufacturing business, and the subsequent sale of the property to Phillipsburg Associates (c/o Preferred Real Estate Investments).

Currently, the following companies conduct operations at the site:

- Curtiss-Wright Corporation - pump manufacturing;
- Flow Serve – storage and administrative offices;
- Stateline Fabricators – structural steel fabrication;
- Village Bus Company – school bus operations;
- Truarc – snap ring manufacturing;
- Brown/Brown – insurance offices;
- Eupen – cell tower hardware distributor;
- Celldex – pharmaceutical research temporary office;
- Faro Design – furniture distributor; and
- Preferred Real Estate Investments (PREI) - general administrative offices.

2.3 Development of the site

Prior to Ingersoll Rand's purchase of the Phillipsburg facility circa 1903, the property was predominantly used for agricultural purposes. Subsequent to Ingersoll Rand's purchase of the site, the farms were replaced with an industrial complex (Main Facility Area) with a variety of structures ranging from large manufacturing facilities, to moderately sized support and administrative buildings, and smaller sheds, storage structures, and other structures. A detailed site history was presented in the October 2004 Site History Report (SHR) and presents a more thorough review of site development and use of the site.

Historically, activities conducted onsite included the manufacturing of hammer drills and rock drills, compressors, and pumps; product testing; assembly of railroad locomotives; various metal working and treating operations including heat treating, sand and shot blasting, and pickling; metal finishing and painting; facility maintenance; boiler operations; bulk storage of oil and other materials; medical diagnostics and first aid. Multiple shaving and scrap bins for the temporary storage of metal pieces and cuttings generated during metal working activities were located throughout the Main Facility Area. Miscellaneous storage sheds were also present across the site and included lumber and coal storage, horse stables, vehicle garages, and maintenance sheds. Several buildings have either been demolished, are currently vacant, and/or have been renovated by current tenants for their operations. In addition to remaining structures, there are former concrete building slabs, foundations, roads, paved parking areas and landscaped areas throughout the Main Facility Area.

Metal casting operations were centered in the Foundry Area to the west of the Main Facility Area. The Foundry Area was one of the first areas developed on the property, with the construction of the original foundry buildings completed around 1905. Generally, the Foundry Area was continually used, expanded, and reorganized through the 1970's. The various structures present throughout the Foundry's history included several pattern storage buildings, a dedicated brass and aluminum foundry, a dedicated steel foundry, a dedicated casting cleaning building, and a casting X-ray facility, among others. With the decline of manufacturing activities, onsite foundry operations were ceased in the 1980's at the iron foundry and the casting cleaning building, and in the 1990's for the steel foundry and brass and aluminum foundry. Additionally, an experimental mine was located beneath the eastern portion of the Foundry Area.

The Cameron Area consists of approximately 20 acres of formerly developed land at the southwestern corner of the property. This area was previously the center of Ingersoll Rand's Cameron Pump Division operations, which consisted of multiple manufacturing and testing buildings; all of which have been demolished. Currently, this portion of the property consists of former concrete building slabs, foundations, and loading docks; former railroad lines; and roads connecting the Cameron Area to the remainder of the facility.

Located to the east of the Cameron Area is the non-operating Old Landfill and a permitted Class II Sanitary Landfill formerly used by Ingersoll Rand for the disposition of construction debris and spent foundry sand.

In addition to the buildings, a concrete lined reservoir (Spray Pond) was completed circa 1905 in the southeast corner of the Main Facility Area. The Spray Pond originally supplied facility operations with process and cooling water for the boiler house and accepted stormwater and non-contact cooling water. The Spray Pond discharges to downstream inverse ponds and ultimately to the Lopatcong Creek under a Discharge to Surface Water (DSW) permit (Permit No. NJ0157538).

Since the 1980s, production activities at the site had declined due to consolidation of operations at other Ingersoll Rand locations resulting in the moving of pump operations to the Main Facility Area. In early August 2000, the pump manufacturing business was sold to FlowServe Corporation (FlowServe) which continued to operate at the Main Facility Area under a lease from Ingersoll Rand.

In September 2004, Ingersoll Rand sold the former property to Phillipsburg Associates, LP, Phillipsburg Associates I, LP, Phillipsburg Associates II, LP, and Phillipsburg Associates III, LP (c/o Preferred Real Estate Investments, Inc.) who is working to lease, sell, and/or develop the entire site into a light industrial/commercial complex.

2.4 Areas of concern

ENSR understands that Ingersoll Rand is obligated, under the terms of their agreements with PREI to conduct required investigation and remedial activities pursuant to the Administrative Consent Order (ACO) between the State of New Jersey and Ingersoll Rand and to accelerate these activities based on PREI's development schedule.

Remedial activities at this site are being conducted in accordance with an ACO between the State of New Jersey and Ingersoll Rand. As per the ACO, Ingersoll Rand is required to investigate and remediate, if necessary, any hazardous materials present at the site. Additionally, pursuant to the recent property transaction between Ingersoll Rand and PREI, Ingersoll Rand is obligated to accelerate investigative and remedial activities for soil in good faith effort to receive a No Further Action determination and open various portions of the site for development.

2.4.1 Soil

Based on the number of individual potential AOCs identified, the extent of sampling previously conducted to assess the previously identified AOCs, and the continuing identification of overlapping AOC boundary impacts attributed to individual AOCs, a site-wide approach including grid-based soil sampling in some areas was proposed to address potential impacts across the site. Overall, the proposed remedial actions consisting of deed notice and engineering controls are consistent with the planned future commercial/industrial use of the site and will prevent and/or limit direct contact with potentially impacted soil.

Site soils may be impacted with petroleum hydrocarbons (TPHC) (i.e. cutting or quench oils), polychlorinated biphenyls (PCBs), select metals (specifically arsenic, copper, lead, nickel, thallium, and zinc) and polycyclic aromatic hydrocarbons (associated with cutting oils and/or incomplete combustion at the former incinerator sites). A list of AOCs and contaminants of concern is included in Table 1. Locations of AOCs are shown on Figure 1.

2.4.2 Groundwater

Presently four AOCs have been identified related to groundwater at the site. These AOCs include a light non-aqueous phase liquid (LNAPL) plume (AOC-18 and AOC-43) which resides largely in the facility area and a dissolved phase plume (AOC-42 and AOC-44) of chlorinated organic compounds which has been identified south of the Old Landfill and sporadically across the site.

In approximately 1987, a product recovery and groundwater treatment system was installed to remove liquid and dissolved phase contaminant mass from the groundwater. The system includes nine (9) groundwater and free phase product recovery wells. Subsurface piping conveys groundwater from each wellhead to the oil-water separator house (Building 104). The passive oil/water separation system consists of three 10,000-gallon single walled steel tanks in series. Industrial wastewater discharge outfall 002A is the location of the discharge from the oil/water separators which passively treat the groundwater from the nine (9) recovery wells. Outfall 002A discharges into the Spray Pond. LNAPL recovered from these wells are pumped separately to ASTs located adjacent to each well head.

During the January 2006 well gauging effort, product was measured in MW11, MW12, MW26, MW28A, RW1, RW2, RW3, RW4, RW5, RW6, RW8, RW8A, RW9, RW12, RW15, RW16, and RW17. Product thickness measured in these wells ranged from 0.01 feet to 2.56 feet in RW6.

Chlorinated VOC contamination above the NJDEP GWQS was detected in MW16, MW32, MW33A, MW34, MW35, MW37, MW4 and MW6, RW9, RW15, RW16, THWLS, and TH36. Compounds detected at the highest frequency in these wells include trichloroethylene and 1,1-dichloroethylene. Other compounds detected include 1,1,1-trichloroethane, 1,1-dichloroethane, tetrachloroethylene, vinyl chloride, and chloroethane.

ENSR will continue to conduct semi-annual groundwater sampling in April and October 2006. Sampling procedures will consist of standard purging and sampling, PDB sampling techniques, and/or low-flow purging and sampling. Procedures have been selected based on previous analytical results, correlation of PDB samples collected during the comprehensive groundwater sampling, and data requirements (i.e., vertical delineation). Groundwater sampling logs will be recorded for each sampling event as above. Samples will be submitted to a NJDEP-certified laboratory for analysis of VOC+10 and MNA parameters (MNA parameters will be collected in April only).

The site's currently existing and unused potable wells (WW2 and WW3) will be sampled if accessible. Sampling procedures for WW2 and WW3 will consist of three to five PDB samplers deployed in the screened interval of the well.

3.0 Scope of work

3.1 Overall scope of site activities

The overall scope of site activities that is addressed in this HASP includes the following:

- Conduct soil and groundwater investigative and remedial activities including;
- Conduct a sub slab vapor intrusion study;
- Conduct offsite foundry sand delineation;
- Continue groundwater investigation activities and interim remedial activities for LNAPL impacts at the site, along with hydro-geologic investigations at approximately 15 wells, including:
 - Salt slug conductivity testing
 - Packer testing
 - 72-hour pump test
 - Residential well sample collection
- Upgrade and retrofit of four wells and the installation of one deep well along with hydro-geologic investigations;
- Semi-annual groundwater sampling of select monitoring and recovery wells;
- Potable well investigation of WW2 and WW3;
- Manage and implement Ingersoll Rand's environmental responsibilities related to the site-specific permits and operational requirements that will be retained by Ingersoll Rand as well as the permits which will be transferred to Preferred Real Estate Investments (PREI); and,
- Coordinate activities at the site with PREI to facilitate development at the site pursuant to Ingersoll Rand's agreement with PREI.

IR is also obligated to implement several large scope remedial projects including the closure/capping of the Old Landfill, closure of the Inverse Ponds and removal of sediment from the Spray Pond, and Cameron area remedial action/closure activities. These large scale remediation tasks are not addressed within this document as the final design and scope of work for each closure project has not been prepared. Ultimately, a stand-alone HASP will be prepared for each proposed closure activity.

3.1.1 Soil investigation

3.1.1.1 Sub-slab vapor sampling and confirmatory indoor air sampling

Based on NJDEP draft guidance, ENSR proposes to conduct sub-slab and confirmatory indoor air sampling in the same locations as the original IAQ samples collected in 2005. The objectives of this task are to collect a second IAQ data set for comparison to and verification of the original data and to evaluate vapor concentrations below each building slab.

Sub-slab sampling is proposed to be conducted concurrently with the indoor air sampling event in order to evaluate vapor concentrations of the sub-slab contaminants of concern. Samples will be collected using the methods prescribed in NJDEP's 2005 Vapor Intrusion Guidance. Specifically, ENSR will conduct the following.

- A 3/4-inch diameter hole will be bored through the concrete slab to allow access to the sub-slab space;
- A 1/4-inch diameter long stainless steel pipe with a metal cap placed in the hole extending approximately two to three inches below the bottom of the concrete slab;
- The void between the pipe and concrete slab will be sealed with Ben-Seal®;
- The stainless steel pipe will be connected to a sampling pump and an evacuated 6-Liter Summa® canister for the collection of air sample;
- The air sample will be collected over a period of approximately 24 hours; and
- The air samples will be submitted for analysis to ENSR's Air Toxics Laboratory in Harvard, MA (a NJ-certified laboratory) for VOCs using USEPA Method TO-15.

3.1.1.2 Offsite delineation of foundry sand fill

On August 19, 2005 ENSR submitted a Petition for Variance to NJDEP regarding the delineation of impacts related to foundry sand-derived fill beyond the property boundary. Assuming NJDEP-approval of the petition for variance, ENSR will conduct twelve soil borings along the western property boundaries along Roseberry Street, Center Street, Green Street, and the railroad right-of-way at intervals of approximately every 500 feet.

Proposed soil borings will be conducted through local streets or sidewalks, under appropriate local permits (i.e., street opening permits) as may be necessary. Each soil boring will be advanced to approximately 8 feet below ground surface (bgs) and continuous soil cores will be collected. Soil cores will be screened for volatile organic compounds with a photo-ionization detector (PID) and characterized by ENSR field personnel. If foundry sand is identified in soil along the eastern edges of the road/rail, additional soil borings may be conducted on the western side of the road or railway to determine the horizontal extent of foundry sand-derived fill material.

3.1.2 Groundwater investigation

3.1.2.1 Salt slug testing

The salt-slug testing is proposed to be conducted in up to 12 wells, primarily focused in the Cameron Area, south of the Main Facility Area, and the eastern Farm Field providing a general coverage of the site's boundaries. Testing will consist of adding a salt solution with elevated specific conductance to the top of the water column in each well and monitoring the well for conductivity and temperature changes. As the solution drifts downward through the water column, the specific conductance within the water column will change. The general drift of the solution may be affected by active fractures within the well, providing knowledge of which water-bearing fractures are active. Depending on the initial response, the testing may be repeated by introducing the salt solution at different levels in the well and/or incorporating a small rate of pumping to encourage flow within the borehole.

All conductivity/temperature logging will be recorded electronically in the field. Hard copy logs will be produced in the field for record-keeping, reporting, and comparison with final logs completed after data analysis. This new information will be incorporated into the geophysical database and utilized in the updated geologic model. It will also be used to help guide well retro-fitting and selecting zones for packer testing.

3.1.3 Packer testing

Packer testing will be performed in up to 15 wells, with three separate intervals tested in each well. Packer testing consists of lowering inflatable packers into an open borehole, inflating the packers to isolate specific sections of the borehole, testing for yield/permeability, measurement of hydraulic head, and collection of groundwater samples. Groundwater samples will be analyzed for VOC+10 in standard turnaround time. The isolated section within the borehole represents a single fracture or fracture zone rather than a borehole average. The results from packer tests will be used to select appropriate open intervals for the well retrofitting (if necessary), help to delineate vertical extent of contamination, and to provide specific information concerning the fate and transport of CVOCs along the site's boundaries.

3.1.4 Aquifer stress test (72-hour pump test)

ENSR proposes additional aquifer pumping tests to be performed to evaluate hydraulic connections between wells/fractures and possible migration pathways on Site. One 72-hour pump test is proposed to be performed in 2006, at a monitoring well MW20, located in the eastern farm field. The specific well will be selected based on the results of the previous tasks (such as the geophysics and salt-slug testing).

Overall the pumping test will be conducted over a ten day period, consisting of three days of background water level monitoring, one day for step-drawdown pumping and establishing a desired pumping rate, three days of active pumping at a constant rate, and three days of monitoring the recovery of water levels. All water levels will be measured and recorded using trolls and data-logging equipment. Manual water levels will also be measured periodically during the 10-day period. During the 72-hour active pumping period, two ENSR personnel will be onsite continuously to ensure continued operation of the pump, collect manual water-level measurements as appropriate, and provide security for the equipment. Groundwater will be discharged to the ground surface, down-gradient away from the wellhead.

3.1.5 Off-site groundwater delineation

Based on the review of the NJDEP Bureau of Water Allocation (BWA) Well Search conducted in 2002, ENSR conducted supplemental activities in 2003 and 2004 to make corrections to the well locations provided in the well search results. Due to discrepancies in BWA records, ENSR has been conducting a review of those properties which are currently connected to the city water system via a search of water company records. Based on the results of this off-site well search, ENSR will determine which locations may have potable wells and request confirmation from the property owner of water service.

If potable wells are determined to be present on targeted properties, a request to sample the wells will be submitted to the property owner; and upon property owner authorization, ENSR will sample any offsite potable wells. For the purpose of this proposal, ENSR is assuming ten properties will be identified and sampled for VOC compounds via Method 524.2. ENSR proposes to provide analytical results from potable well sampling to Ingersoll Rand prior to submission to each property owner.

3.1.6 Well retrofits

ENSR proposes to conduct upgrade and retrofit activities at four site wells in 2006. These wells (MW18, MW20, MW38, and THWLS) have all collapsed to a point where they are either not sample-able or we cannot retrieve geophysical or hydrologic data from these wells.

The proposed upgrade and retrofitting will consist of re-drilling each well to the original depth (if necessary) using air-rotary drilling methods, installing a 25 foot long steel screen across an appropriate interval with steel riser to the surface. Gravel pack may be installed around the casing if deemed appropriate or a packer will be installed above the screened interval prior to grouting the riser in place. Geophysical logging will be completed for each of the three wells, if necessary prior to the installation of steel casing (see Section 2.11.4) in order to assist in determining the proper screening interval. Geophysical investigation will include optical televiewer (OPTV) and caliper logging.

3.1.7 Deep well installation

As discussed in the August 2005 *Groundwater Remedial Investigation Workplan*, ENSR is conducting vertical delineation in a phased approach. In 2006, ENSR proposes to install one deep bedrock monitoring well, MW56, at the northwest corner of the Old Landfill. The method proposed consists of advancing pilot boreholes to various depth and conducting appropriate geophysics and hydrologic investigation to determine the most appropriate well construction. Well construction will be modified as necessary based on the results of pilot borehole investigations in addition to conditions observed during final well installation.

The three pilot boreholes would consist primarily of 6-inch boreholes being drilled via air-rotary drilling techniques. The initial pilot borehole would consist of a temporary casing installed to the bedrock surface followed by air-rotary drilling to a depth at which an unstable area of bedrock is encountered. Geophysics (OPTV and caliper logging) and packer testing including the collection of VO+10 groundwater samples from isolated intervals would be completed in 100-foot intervals of this open borehole. Subsequently, 6-inch casing would be advanced to block off the borehole and the area of instability. The borehole could be continued using 4-inch air rotary drilling to final depth or until the next area of instability was encountered. Again, geophysics, packer testing, and groundwater sampling would be completed in 100-foot intervals in this second portion of open borehole. A second and/or third borehole could be completed by installing temporary casing to the last depth of instability and continuing air-rotary drilling from that depth. This procedure will continue until sufficient vertical characterization has been completed, the underlying sandstone is encountered, or at a maximum depth of 600 feet. Upon completion of the pilot borehole program, the boreholes will be properly abandoned.

Based on an evaluation of the findings during the pilot borehole drilling, geophysics, packer testing, and groundwater sampling results, ENSR proposes the installation of a deep bedrock monitoring well that includes air-rotary drilling and telescoping of steel casings with a minimum of 4-inch annular spaces to meet NJDEP requirements. ENSR proposes construction to consist of initially setting a wide diameter steel casing (12-inch) approximately 10 feet into competent bedrock. Subsequently, a 10-inch diameter open hole will be extended approximately 200 feet and an 8-inch casing will be grouted in place. An 8-inch diameter borehole would then be continued another 200 feet and a 6-inch casing would be grouted. Finally, a six-inch diameter borehole would be extended to final depth and a 4-inch diameter casing with 25-foot of screen would be placed. This interval would receive a gravel pack in the screened interval and would be grouted to the surface.

The specific methodology and approach for installing these test pilot holes and the deep well installation is still being negotiated with NJDEP, and final selection may be dependent on the findings from other tasks.

3.1.8 Groundwater sampling

ENSR will continue to conduct semi annual groundwater sampling in April and October 2006. Sampling procedures will consist of standard purging and sampling, PDB sampling techniques, and/or low-flow purging and sampling. Samples will be submitted to a NJDEP-certified laboratory for analysis of VOC+10 and MNA parameters (MNA parameters will be collected in April only).

The site's currently existing and unused potable wells (WW-2 and WW-3) will be sampled if accessible. Sampling procedures for WW-2 and WW-3 will consist of three to five PDB samplers deployed in the screened interval of the well.

ENSR has proposed to sample up to 20 wells for natural attenuation indicator parameters during the April 2006 sampling event. Parameters will be indicative of geochemical conditions and break-down products, including carbonate/bicarbonate alkalinity, nitrate, ammonia, sulfate, sulfide, iron speciation (Fe+2, Fe+3), chloride, ethane, ethene, methane, dissolved oxygen, oxygen-reduction potential, and microbiological activity (plate count). Depending on the results from the October 2005 sampling, samples may also be analyzed for hydrogen gas in April 2006. The natural attenuation parameters will be collected using low-flow sampling techniques as described in the 2005 NJDEP Field Sampling Procedures Manual, with purge rates less than 1L/min and draw downs stabilizing at less than 1 foot.

3.1.9 Potable well investigation

To aid in both the horizontal and vertical delineation of the dissolved phase impacts, ENSR proposes to convert the former potable well(s) into deep monitoring wells. This is consistent with NJDEP's comments contained in their October 25, 2004 letter and the groundwater work plan of August 2005. Potable Well WW1 remained in operation during 2005 and ENSR anticipates that operation of this well will continue through 2006. Therefore, no investigation work is proposed for this well. Preliminary investigation work was completed on former potable wells WW2 and WW3 in 2005. This work included preliminary down-hole video-logging of WW2 and WW3, the removal of the pump housing from WW3, and groundwater sampling and analysis of WW2. ENSR proposes to complete the investigation of WW2 and WW3 in 2006 and to make a determination as to whether either may be used as deep monitoring wells or if they should be abandoned. To complete this investigation, ENSR proposes the following.

- ENSR will submit a proposed well construction diagram to NJDEP-BWA that details the proposed final construction of WW2 to convert it into a functioning monitoring well.
- The scope of work required to convert WW3 into a monitoring well is dependent upon the results of additional investigation activities remaining in 2005; clearing WW3 and inspection of the structural integrity.
- Following a review of the WW3 video survey, ENSR will collect groundwater samples for laboratory analysis using the same techniques used for existing monitoring wells. Groundwater samples will be analyzed at a New Jersey Certified Laboratory for VOC+10. ENSR proposes the collection of groundwater samples from WW3 via PDB samplers during the semi-annual groundwater sampling event in April 2006.
- If the video survey indicates that WW3 is structurally sound, ENSR will propose that NJDEP permit this well as a monitoring well with the existing construction.

4.0 Chemical hazard assessment and control

4.1 Chemical hazards

Soils are impacted predominantly by petroleum hydrocarbons (TPHC), metals including arsenic, copper, lead, mercury, nickel, and zinc, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and chlorinated volatile organic compounds (VOCs).

Groundwater contamination includes the presence of separate phase and dissolved petroleum compounds and dissolved chlorinated VOCs.

4.1.1 Fuel oil/petroleum hydrocarbons

Fuel oil is generally considered to be of moderate to low toxicity. Federal or recommended airborne exposure limits have not been established for the vapors of fuel oil. Inhalation of the vapor or mist may cause headache, dizziness, nausea, vomiting, and a loss of coordination. Inhalation of high concentrations of the vapors may cause extensive pulmonary edema. Chronic direct skin contact with the liquids may produce skin irritation as a result of defatting. Repeated skin contact may also cause irritation of the hair follicles and block the sebaceous (sweat) glands which may produce a rash of acne pimples and spots at the locations of contact.

4.1.2 Chlorinated VOCs

Overexposure to the chlorinated VOCs likely to be present in the site groundwater may result in depression of the central nervous system, symptoms of which include, dizziness, headache, giddiness and drunken-like behaviors. Chronic overexposures can result in liver and kidney damage. The OSHA permissible exposure limit (PEL) for tetrachloroethylene (PCE) is 100 ppm, as an 8-hour, time-weighted average (TWA). However, the American Conference of Governmental Industrial Hygienists (ACGIH) recommends a threshold limit value (TLV) of 25 ppm, as an 8-hr TWA. Similarly, the OSHA PEL for trichloroethylene (TCE) is 100 ppm, but the ACGIH TLV is 50 ppm. The OSHA PEL for 1,1,1-trichloroethylene (TCA) is 350 ppm. OSHA does not regulate 1,2-dichloroethylene, but the ACGIH does recommend a TLV of 200 ppm.

4.1.3 Polycyclic aromatic hydrocarbons

Polycyclic aromatic hydrocarbon (PAH) compounds are a family of multiple ring aromatic compounds commonly found in fossil fuels and formed from the incomplete combustion of organic materials. Repeated contact with PAH compounds may cause photosensitization of the skin, producing skin burns after subsequent exposure to ultra-violet light. Certain PAHs as a group are considered potential human carcinogens (CaPAH).

4.1.4 Metals

The primary metals of concern at this site are arsenic, copper, lead, mercury, nickel, and zinc.

4.1.4.1 Arsenic

Arsenic and arsenic compounds, especially trivalent arsenic compounds (i.e., arsenic trichloride), are corrosive to the skin. Brief contact has no effect, but prolonged contact results in local inflammation. The moist mucous membranes are most sensitive to the irritant action. The wrists may also be a common area of dermatitis if personal hygiene is poor. Inhalation of dusts contaminated with inorganic arsenic compounds result in general malaise, heaviness in the stomach, conjunctivitis, skin lesions, throat soreness and a feeling of numbness in the hands and/or feet which is typically only sensory. Perforation of the nasal septum may also occur. Chronic overexposures to both trivalent and pentavalent arsenic compounds, such as lead arsenate and calcium arsenate) are known to cause lung, lymphatic, and skin cancers in humans. The OSHA PEL for inorganic arsenic is 0.01 mg/m³.

4.1.4.2 Copper

Copper is a reddish-brown metal that is widely used in the electronics industry, plumbing, heating, roofing, chemical, pharmaceutical machinery and in building construction.

Exposure to copper dust and fume can irritate the eyes, nose and throat causing coughing, wheezing, nosebleeds, ulcers, and a hole in the "bone" dividing the inner nose. Copper fume may cause "metal fume fever". This is a flu-like illness with symptoms of metallic taste, fever, and chills, aches, chest tightness and cough. A dermal exposure to copper may result in a skin allergy. Repeated high exposures to copper can adversely affect the liver.

The Occupational Safety and Health Administration (OSHA) has set an occupational exposure limit of 1 milligram of copper dust and mist per cubic meter of air (1 mg/m³) and 0.2 mg/m³ for copper fume for an 8-hour workday, 40-hour workweek.

4.1.4.3 Lead

The OSHA PEL for inorganic lead is 50 µg/m³. In general, the inhalation of metal dusts is irritating to the upper respiratory tract and nasal mucous membranes. Most metal dusts cause dermatitis and/or eye irritation. The early symptoms of lead poisoning, as a result of overexposure (either through ingestion or inhalation) include fatigue, sleep disturbance, headache, aching bones and muscles, digestive irregularities, abdominal pains, and decreased appetite. Chronic overexposures to lead affect the central nervous system and male and female reproductive systems. Lead has also been identified as a fetotoxin.

4.1.4.4 Mercury

Mercury is a naturally occurring metal, which has several forms. The metallic mercury is a shiny, silver-white, odorless liquid. If heated, it is a colorless, odorless gas.

Mercury combines with other elements, such as chlorine, sulfur, or oxygen, to form inorganic mercury compounds or "salts," which are usually white powders or crystals. Mercury also combines with carbon to make organic mercury compounds. The most common one, methylmercury, is produced mainly by small organisms in the water and soil. More mercury in the environment can increase the levels of methylmercury that these small organisms make.

Metallic mercury is used to produce chlorine gas and caustic soda and also used in thermometers, dental fillings, and batteries. Mercury salts are used in skin-lightening creams and as antiseptic creams and ointments.

- Inorganic mercury (metallic mercury and inorganic mercury compounds) enters the air from mining ore deposits, burning coal and waste, and from manufacturing plants.

- It enters the water or soil from natural deposits, disposal of wastes, and volcanic activity.

4.1.4.5 Nickel

Nickel compounds are also used for nickel plating, to color ceramics, to make some batteries, and as substances known as catalysts that increase the rate of chemical reactions. Nickel and its compounds have no characteristic odor or taste.

Nickel can enter the body by:

- By breathing air or smoking tobacco containing nickel
- By eating food containing nickel, which is the major source of exposure for most people
- By drinking water which contains small amounts of nickel
- By handling coins and touching other metals containing nickel

The most common adverse health effect of nickel in humans is an allergic reaction. People can become sensitive to nickel when jewelry or other things containing it are in direct contact with the skin. Once a person is sensitized to nickel, further contact with it will produce a reaction. The most common reaction is a skin rash at the site of contact.

Less frequently, some people who are sensitive to nickel have asthma attacks following exposure to nickel. People who are sensitive to nickel have reactions when it is in contact with the skin, and some sensitized persons react when they eat nickel in food, drink it in water, or breathe dust containing it.

Lung effects, including chronic bronchitis and reduced lung function, have been observed in workers who breathed large amounts of nickel. Current levels of nickel in workplace air are much lower than in the past, and today few workers show symptoms of nickel exposure.

People who are not sensitive to it must eat very large amounts of nickel to show adverse health effects. Workers who accidentally drank water containing very high levels of nickel (100,000 times more than in normal drinking water) had stomachaches and effects to their blood and kidneys.

Animal studies show that breathing high levels of nickel compounds may result in inflammation of the respiratory tract. Eating or drinking large amounts of nickel has been reported to cause lung disease in dogs and rats and to affect the stomach, blood, liver, kidneys, immune system, and reproduction and development in rats and mice.

The Occupational Safety and Health Administration (OSHA) has set an occupational exposure limit of 1 milligram of nickel per cubic meter of air (1 mg/m^3) for an 8-hour workday, 40-hour workweek.

4.1.4.6 Zinc

Zinc combines with other elements to form zinc compounds. Common zinc compounds found at hazardous waste sites include zinc chloride, zinc oxide, zinc sulfate, and zinc sulfide. Zinc compounds are widely used in industry to make paint, rubber, dye, wood preservatives, and ointments.

Zinc can enter the body by:

- Ingesting small amounts present in food and water
- Drinking contaminated water near manufacturing or waste sites

- Drinking contaminated water or a beverage that has been stored in metal containers or flows through pipes that have been coated with zinc to resist rust
- Breathing zinc particles in the air at manufacturing sites.

Harmful health effects generally begin at levels from 10-15 times the RDA (in the 100 to 250 mg/day range). Eating large amounts of zinc, even for a short time, can cause stomach cramps, nausea, and vomiting. Taken longer, it can cause anemia, pancreas damage, and lower levels of high density lipoprotein cholesterol (the good form of cholesterol).

Breathing large amounts of zinc (as dust or fumes) can cause a specific short-term disease called metal fume fever. This is believed to be an immune response affecting the lungs and body temperature. The long-term effects of breathing high levels of zinc are not presently known.

The Occupational Safety and Health Administration (OSHA) has set a maximum concentration limit for zinc chloride fumes in workplace air of 1 milligram of zinc per cubic meter of air (1 mg/m³) for an 8-hour workday over a 40-hour work week and 5 mg/m³ for zinc oxide fumes.

4.1.5 Polychlorinated biphenyls

Polychlorinated biphenyls (PCBs) are a series of technical mixtures consisting of many isomers and compounds that vary from mobile oily liquids to white crystalline solids to hard non-crystalline resins. PCB containing fluids were commonly used as the coolant in heavy duty transformers and capacitors. Since pure PCBs are highly viscous, they were typically mixed with an organic solvent, such as trichlorobenzene, to allow the transformer fluid to flow. Depending upon the age of the transformer, the PCB concentration in transformer fluids can range from a few ppm to many hundreds of ppm.

PCBs are generally considered to be of moderate to low toxicity. The higher the chlorine content of the PCBs, the greater the toxicity is likely to be. Exposure to PCBs can cause liver damage at high concentrations. Prolonged exposure to large doses of PCBs has been shown to cause cancer in laboratory animals. However, no strong evidence indicates that PCBs are human carcinogens. Dermal contact with liquid PCBs may produce skin irritation or a rash, often referred to as "chloracne." Eye contact with PCB fluids is likely to produce eye irritation.

4.1.6 Exhaust gases during interior drilling

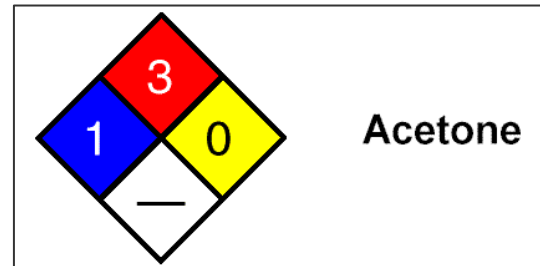
Some of the soil borings may be advanced within the site buildings. As such, the build up of exhaust gases from gasoline-powered internal combustion engines is a concern. Carbon monoxide is the most toxic of the exhaust gases. Carbon monoxide is an asphyxiant in that it prevents hemoglobin from binding with oxygen. Symptoms of acute carbon monoxide poisoning include intense headache, dizziness, nausea, and collapse. Initially the victim is pale; later the skin and mucous membranes may turn cherry-red in color. The OSHA PEL for carbon monoxide is 35 ppm, as an 8-hour TWA with a ceiling value of 200 ppm. The ACGIH recommends a TLV of 25 ppm, as an 8-hr TWA.

4.1.7 Hazardous substances brought on site by ENSR or subcontractors

A material safety data sheet (MSDS) must be available for each hazardous substance that ENSR or subcontractors bring on the property. This includes solutions/chemicals that will be used to decontaminate drilling, excavation and/or sampling equipment, and gases needed to calibrate air monitoring equipment. All containers of hazardous materials must be properly labeled in accordance with OSHA's Hazard

Communication Standard.

In addition, all containers of hazardous materials must be labeled in accordance with OSHA's Hazard Communication Standard. Either the original manufacturer's label or an NFPA 704M label specific for the material (as shown at the right) is considered to be an acceptable label.



4.2 Chemical exposure and control

4.2.1 Chemical exposure potential

ENSR and subcontractors should be prepared to encounter contamination during the proposed subsurface activities. The major contaminants of concern, including TPHC, PCBs, PAHs, chlorinated VOCs, and metals, as well as those contaminants associated with particular AOCs, are non-volatile so the potential employee exposures to these contaminants will be limited to the inhalation of dusts. Similarly, the oils present at the site are related to quench and cutting oils which do not contain high concentrations of volatile organic compounds. Chlorinated organic compounds have been detected in the groundwater, but to date no significant concentrations of these compounds have been detected in site soils.

Aside from the potential for inhaling impacted dusts during drilling and excavation activities, another primary potential route of exposure to site contaminants is via direct dermal contact with soils and groundwater and equipment that has come in contact with soils and groundwater.

4.2.2 Chemical exposure control

ENSR will use several methods to control the potential for chemical exposure during the proposed investigations:

- During subsurface activities, including soil boring, well installation and soil excavation, soils will be screened using a photoionization detector (PID). As a precautionary measure, the breathing zone of employees will also be screened with the PID during these activities. If sustained VOC concentrations exceed the established action levels, as defined in Section 6.1, respiratory protection and/or engineering controls, as indicated in Section 7.2, a half-mask air-purifying respirator will be donned.
- If dust is generated during well installation and excavation activities, a light mist of water will be applied to the work areas.
- To avoid direct dermal contact with contaminated media, protective clothing such as nitrile and/or latex gloves, as described in Section 7.1, will be required.
- Although highly unlikely, exposure to all of the contaminants of concern may occur via ingestion (hand-to-mouth transfer). The decontamination procedures described in Section 9.0 address personal hygiene issues that will limit the potential for contaminant ingestion.

5.0 Physical hazards and controls

5.1 Utility hazards

5.1.1 Underground utilities

New Jersey law requires that, at least 72 hours prior to initiation of any subsurface work, a utility clearance be performed at the site. The contractor(s) will contact New Jersey One Call (1-800-272-1000) to request a mark-out of underground utilities in the proposed drilling and excavation areas. Work will not begin until the required utility clearances have been performed.

Public utility clearance organizations typically do not mark-out underground utility lines that are located on private property. As such, ENSR and/or the subcontractor(s) must exercise due diligence and try to identify the location of any private utilities on the properties being investigated. ENSR and/or the subcontractor(s) can fulfill this requirement in several ways, including:

- Obtaining as-built drawings for the areas being investigated from the property owner;
- Visually reviewing each proposed soil boring locations with the property owner or knowledgeable site representative;
- Performing a geophysical survey to locate utilities;
- Hiring a private line locating firm to determine the location of utility lines that are present at the property;
- Identifying a no-drill zone; or
- Hand digging in the proposed soil boring locations if insufficient data is available to accurately determine the location of the utility lines.

5.1.2 Overhead utilities

Be particularly aware of overhead power lines in the work area. Any vehicle or mechanical equipment capable of having parts of its structure elevated (drill rig, crane etc.) near energized overhead lines shall be operated so that a clearance of at least 10 feet is maintained. If the voltage is higher than 50kV, the clearance shall be increased 4 inches for every 10kV over that voltage.

5.2 Traffic hazards

The facility where the soil and groundwater investigations are being conducted is currently active and utilized by several tenants as a school bus depot and parking area, shipment and deliveries at several loading docks, warehouse storage locations, and administrative offices. Day-to-day traffic associated with these tenants will impact the field team during the implementation of the proposed investigations.

The off-site foundry investigation will require that soil borings are advanced along the western property boundaries along Roseberry Street, Center Street, Green Street, and the railroad right-of-way at intervals of approximately every 500 feet. To complete this task, access approval from local agencies and the railroad company and will need to be secured. ENSR expects that a flagman and similar railroad support will be necessary to conduct soil borings in the right-of-way and that police and traffic control will be required for the soil borings along the roads. Proposed soil borings will be conducted through local streets or sidewalks, under appropriate local permits (i.e., street opening permits) as may be necessary.

When working in high traffic areas, the following precautions should be implemented so that motorists are warned of your presence:

- Notify the property owner of your work location, dates of work and the anticipated work times. Suggest the possibility of a detour around the work area;
- Wear an ANSI-approved Class II safety vest; and
- Set up traffic cones, safe-t-barriers or barrels 50 feet in front of the work area. "Men at Work" signs should also be placed in a conspicuous area to warn others of your presence.

5.3 Clearing and grubbing

The clearing and grubbing of overgrown vegetation and trees in some of the proposed areas of investigation may be necessary. Although typically, the overgrown materials are simply knocked down with excavation machinery, in some instances a chain saw or other manual means of removal are used. When using a chain saw, the following safety procedures will be implemented:

- Chain saws must be inspected daily to assure that all handles and guards are in place and tight, that all controls function properly and that the muffler is operative.
- Start the saw only on the ground or when otherwise firmly supported.
- Clear brush which might interfere with clear footing before starting to cut.
- Shut off the saw when carrying it for a distance greater than from tree to tree or when surface is slippery or heavy with underbrush. The saw must be at idle speed when carried short distances.
- Do not use the saw to cut directly overhead or a distance at which the operator no longer has a safe grip on the saw. Always use two hands to operate the saw.
- Safety glasses with permanently attached sideshields will be worn underneath a steel mesh faceshield which will attach to standard hard hats. The brush shield is designed to protect the head and face from debris created by using a chain saw.
- Employees will wear Kevlar™ gloves and Kevlar™ chain saw chaps.
- Ear muffs or ear plugs with a minimum noise reduction rating (NRR) of 24 dB must also be worn.

5.3.1 Powered Weed Trimmers

Power grass/weed trimmers can throw stones, sticks, and other objects. These objects can injure the eyes of operators and those nearby. The U.S. Consumer Product Safety Commission estimates that in 1989 there were approximately 4,600 hospital emergency room-treated injuries associated with power lawn trimmers or edgers. About one-third of the injuries were to the eye.

5.3.1.1 Caution

- Power grass/weed trimmers can throw objects and injure eyes.
- Wear goggles to protect eyes.
- Clear away stones, sticks, and other debris before using either a line or blade type weed trimmer in that area.

5.4 Geoprobe™ hazards

Use of the Geoprobe™ System to advance soil borings and collect soil samples will require all personnel in the vicinity of the operating unit to wear steel-toed boots, hardhats, hearing protection and safety eyewear. Personnel shall not remain in the vicinity of operating equipment unless it is required for their work responsibilities. Additionally, the following safety requirements must be adhered to:

- A remote vehicle ignition is located on the control panel of the Geoprobe™ unit. This allows the operator to start and stop the vehicle engine from the rear. This device must be tested prior to job initiation and periodically thereafter. All employees should be aware of how to access and operate the rear ignition.
- The driller must never leave the controls while the probe is being driven.
- Drillers, helpers, and geologists must secure all loose clothing when in the vicinity of drilling operations.
- The Geoprobe™ vehicle shall not be moved any distance with the probe in the extended position. Check for clearance at roof or the vehicle before folding the Geoprobe™ out of the carrier vehicle.
- Be sure the parking brake is set before probing.
- Never allow the derrick foot to be lifted more than 6" off of the ground surface.
- Deactivate hydraulics when adding or removing probe rods, anvils or any tool in the hammer.
- Verify that all threaded parts are completely threaded together before probing.

5.4.1 Cuts and lacerations

Geoprobe™ soil samples are collected in acetate liners that must be cut open in order to collect the sample. Additionally, tubing will need to be cut to facilitate groundwater sampling. Tube-cutters are available and should be used to eliminate this hazard. However, if it is necessary to use knives or blades, follow the safety precautions listed below:

- Keep your free hand out of the way;
- Secure the acetate liner so it won't roll or move while you are cutting;
- Use only sharp blades; dull blades require more force which results in less knife control;
- Pull the knife toward you; pulling motions are easier to manage;
- Don't put your knife in your pocket;
- Use a hooked knife (i.e. linoleum knife) or a utility knife with a self-retracting blade; and
- Wear leather or Kevlar™ gloves when using knives or blades.

5.5 Drilling hazards

5.5.1 Hazards from chipping asphalt and concrete

An increased eye hazard exists during the cutting or chipping of asphalt and/or concrete surfaces to facilitate drilling activities. Employees must wear safety glasses with attached side shields to protect them from flying debris. Employees may also choose to wear a face shield over their glasses if impact from the debris is excessive. This activity also poses potential respiratory (dust) and noise hazards, requiring a respirator and hearing protection.

5.5.1.1 Dust Exposure from Concrete Cutting

Acute Effects:

Cutting, grinding, crushing, or drilling hardened concrete or concrete products may generate dust containing crystalline silica. Repeated exposures to very high levels of respirable crystalline silica (quartz, cristobalite, tridymite) for periods as short as six months have caused acute silicosis. Acute silicosis is a rapidly progressive, incurable lung disease that is typically fatal. Dusts may irritate the nose, throat, and respiratory tract by mechanical abrasion. Coughing, sneezing, and shortness of breath may occur.

Chronic effects:

Chronic bronchitis may result from chronic exposure to dust generated from cutting, grinding, crushing, or drilling hardened concrete. Chronic exposure to respirable limestone dust in excess of the ACGIH TLV has caused pneumoconiosis (Dusty Lung). Concrete dust may contain more than 0.1% crystalline silica, which is a cancer hazard if inhaled. Cancer risk depends on duration and level of exposure. Prolonged exposure to crystalline silica can cause silicosis, a progressive pneumoconiosis (lung disease).

Engineering Controls:

When cutting, grinding, crushing, or drilling hardened concrete, provide general or local ventilation systems, as needed to maintain airborne dust concentrations below the OSHA PELs, MSHA PELs, and ACGIH TLV. Local vacuum collection is preferred since it prevents release of contaminants into the work area by controlling it at the source. Other technologies that may aid in controlling airborne respirable dust include wet suppression, ventilation, process enclosure, and enclosed employee work stations. When exposed to dust above recommended limits, wear a suitable NIOSH-approved respirator with a protection factor appropriate for the level of exposure. Seek guidance from a qualified industrial hygienist or safety professional, prior to respirator selection and use.

5.5.2 Rotary drilling

Use of a drill rig to install soil borings and/or monitoring wells will require all personnel in the vicinity of the operating rig to wear steel-toed boots, hardhats, hearing protection and safety eyewear. Personnel shall not remain in the vicinity of operating equipment unless it is required for their work responsibilities. Additionally, the following safety requirements must be adhered to:

- All drill rigs and other machinery with exposed moving parts must be equipped with an operational emergency stop device. Drillers and geologists must be aware of the location of this device. This device must be tested prior to job initiation and periodically thereafter. The driller and helper shall not simultaneously handle augers unless there is a standby person to activate the emergency stop.
- The driller must never leave the controls while the tools are rotating unless all personnel are kept clear of rotating equipment.
- A long-handled shovel or equivalent must be used to clear drill cuttings away from the hole and from rotating tools. Hands and/or feet are not to be used for this purpose.
- A remote sampling device must be used to sample drill cuttings if the tools are rotating or if the tools are readily capable of rotating. Samplers must not reach into or near the rotating equipment. If personnel must work near any tools which could rotate, the driller must shut down the rig prior to initiating such work.
- Drillers, helpers and geologists must secure all loose clothing when in the vicinity of drilling operations.
- Only equipment which has been approved by the manufacturer may be used in conjunction with site equipment and specifically to attach sections of drilling tools together. Pins that protrude excessively from augers shall not be allowed

- No person shall climb the drill mast while tools are rotating.
- No person shall climb the drill mast without the use of ANSI-approved fall protection (approved belts, lanyards and a fall protection slide rail) or portable ladder which meets the requirements of OSHA standards.

5.6 Noise exposure

Operation of drilling and excavation equipment may expose ENSR employees to noise levels that exceed the OSHA PEL of 90 dB for an 8-hour day. Exposure to noise can result in the following:

- Temporary hearing losses where normal hearing returns after a rest period;
- Interference with speech communication and the perception of auditory signals;
- Interference with the performance of complicated tasks; and,
- Permanent hearing loss due to repeated exposure resulting in nerve destruction in the hearing organ.

Since personal noise monitoring will not be conducted during the proposed activities, employees must follow this general rule of thumb: If the noise levels are such that you must shout at someone 5 feet away from you, you need to be wearing hearing protection. Employees can wear either disposable earplugs or earmuffs but all hearing protection must have a minimum noise reduction rating (NRR) of 27 dB.

5.7 Hand and power tool use

A variety of hand and power tools may be used during the proposed site activities. The use of each can pose serious safety hazards to the user.

5.7.1 Hand tools

The greatest hazards posed by hand tools result from misuse and improper maintenance.

- When using hand tools be sure you have selected the right tool for the job. If a chisel is used as a screwdriver, the tip of the chisel may break or fly off, hitting the user or others.
- Inspect tools for damage such as mushroomed chisel heads or broken hammer handles. If jaws of a wrench are sprung, the wrench may slip. If a wooden handle is loose, splintered or cracked, the head of the tool may fly off.
- Do not use damaged tools.
- Be sure you know how to use the tool you are working with.

5.7.2 Knives and cutting tools

There is the potential for employees to cut themselves when using knives, handsaws and blades that may be used to cut materials, including tubing for groundwater sampling. To prevent the potential for cuts and lacerations, employees will wear either leather work gloves or Kevlar™ gloves. Retractable knives are preferred. When using knives or blades for these activities, follow the safety precautions listed below:

- Keep your free hand out of the way
- Secure your work if cutting through thick material
- Use only sharp blades; dull blades require more force which results in less knife control
- Pull the knife toward you; pulling motions are easier to manage
- Don't put your knife in your pocket

- Use a self-retracting blade
- Wear leather or Kevlar™ gloves when using knives or blades.

5.7.3 Power tools

To prevent hazards associated with the use of power tools, workers should observe the following general precautions:

- Never carry a tool by the cord or hose.
- Never yank the cord or the hose to disconnect it from the receptacle.
- Keep cords away from heat, oil and sharp edges.
- Disconnect tools when not using them, before servicing or cleaning them and when changing accessories such as blades, bits and cutters.
- Secure work with clamps or vise, freeing up both hands to operate the tool.
- Avoid accidental starting. Do not hold fingers on the switch button when carrying a plugged-in tool.
- Keep tools sharp and clean for best performance.
- Wear appropriate clothing. Loose clothing or jewelry can become caught in moving parts.
- Keep all guards in place.

5.7.4 Electric tools

A variety of power tools may also be used during the proposed activities. When using portable tools that are electrically powered, follow the safety precautions listed below:

- Check to see that electrical outlets used to supply power during field operations is of the three wire grounding type.
- Extension cords used for field operations should be of the three wire grounding type and designed for hard or extra-hard usage. This type of cord uses insulated wires within an inner insulated sleeve and will be marked S, ST, STO, SJ, SJO or SJTO.
- NEVER remove the ground plug blade to accommodate ungrounded outlets.
- Do not use extension cords as a substitute for fixed or permanent wiring. Do not run extension cords through openings in walls, ceilings or floors.
- Protect the cord from becoming damaged if the cord is run through doorways, windows or across pinch points.
- Examine extension and equipment cords and plugs prior to each use. Damaged cords with frayed insulation or exposed wiring and damaged plugs with missing ground blades MUST BE REMOVED from service immediately.
- When working in flammable atmospheres, be sure that the electrical equipment being used is approved for use in Class I, Division I atmospheres.
- Do not touch a victim who is still in contact with current. Separate the victim from the source using a dry, nonmetallic item such as a broomstick or cardboard box. Be sure your hands are dry and you are standing on a dry surface. Turn off the main electrical power switch and then begin rescue efforts.

5.8 Welding, cutting, and brazing (Hot Work)

Although ENSR employees do not typically perform hot work, ENSR employees may oversee, or simply be present during operations performed by contractors or subcontractors, which involve hot work. For this reason, it is important that ENSR employees be aware of the hazards associated with, and the safe work procedures, for performing hot work in hazardous locations.

With mud rotary drilling, unthreaded steel casings are often welded together to attain a length of casings that will reach the required well depth. Pockets of flammable or combustible vapors, if present, can be released and ignited during the welding of the casings.

Gas welding is a source of visible light and invisible (infrared and ultraviolet) rays that can burn eyes and skin. UV light is the most harmful fraction of the radiant energy produced. If unprotected, intense irritation of the cornea and eyelids occurs. The action of UV light on the exposed skin of the welder produces a burn similar to sunburn. It is therefore mandatory for the welder to wear welding goggles with an appropriate shaded lens.

Sparks can fly off from the welding arc. The flying sparks, as well as the hot work piece and hot equipment, can cause fires. Do not weld where sparks can strike flammable materials. Remove all flammables and combustibles within 35 feet of the welding area. Keep a fire extinguisher in the welding area. Wear oil-free protective garments. Welders should also wear leather gloves and boots and flame-resistant coveralls that are cuff less.

The contractor is responsible for following all of the gas welding and cutting safety requirements as identified in 29 CFR 1926.350.

5.8.1 General safe work practices

- Where practical, hot work should be performed in a designated location which has been made fire safe.
- Where relocation is impractical, combustible materials shall be protected with flame-proof covers, fire retardant (FR) tarpaulins or otherwise shielded from the ignition source.
- Where the potential for flammable or combustible vapors exists, a combustible gas indicator should be used to determine if hot work activities can be conducted. (See Section 6.1.2 – Combustible Gas Indicator)

5.8.2 Fire extinguishers

Wherever hot work, as described in 5.8, is performed:

- Fully charged and operable fire extinguishers, appropriate for the type of possible fire, shall be available at the hot work location and shall be ready for immediate use. Type A, A-B or A-B-C extinguishers can be used for combustible material fires.

5.8.3 Precautions for hot work performed in the vicinity of potentially flammable atmospheres

Flammable atmospheres may potentially exist in locations where combustible or flammable liquids or gases are stored, handled or used. In addition, flammable atmospheres may be generated at sites where soil or groundwater has been contaminated with combustible or flammable liquids or where flammable gases are generated by the decomposition of material in the soil.

5.8.4 Types of hot work of concern in flammable atmospheres

Because flammable atmospheres can be ignited by flames, sparks or hot surfaces, all types of hot work will be of concern when used in hazardous locations.

Any type of equipment which utilizes an open flame, generates mechanical sparks, or produces high heat, and is therefore capable of igniting a flammable atmosphere, will not typically be approved for use in designated hazardous locations.

Certain electrical equipment is approved for use in hazardous locations. The specific location for which it is approved (e.g., Class 1, Division 1 or Class 1, Division 2) will be marked on its surface. Only approved electrical equipment shall be used in designated hazardous locations or in any location where flammable atmospheres may exist. For example, a flashlight which is to be brought into a location which is known to contain a flammable atmosphere must be approved (and marked) for use in Class 1, Division 1 locations.

5.9 Generator safety

5.9.1 Proper use of the generator

When using a generator on site, follow these safety guidelines:

- Verify that the wattage of the generator being used is sufficient for your project needs.
- Verify that the voltage rating of the generator matches the rating of the equipment you need to operate.
- Properly ground the generator
- Keep water away from the generator. Protect it from rain.
- Use a heavy-duty, three-prong, grounded extension cord.
- Gasoline and it's vapors may ignite if they come in contact with hot components or an electrical spark. Turn the generator off and make sure it has cooled down (i.e 10-minutes) before re-fueling.

5.9.2 Storage of gasoline

Gasoline must be stored in an approved container or tank. A Type II galvanized steel safety can is recommended for storing gasoline that will be used to refuel the generator or other small engine equipment being used on site. Storage in anything other than an approved container is strictly prohibited.

Gasoline is a flammable liquid and should be stored at room temperature, away from potential heat sources such as the sun and away from any on-site ignition sources.

5.10 Back safety

Using the proper techniques to lift and move heavy pieces of equipment is important to reduce the potential for back injury. The following precautions should be implemented when lifting or moving heavy objects:

- Use mechanical devices to move objects that are too heavy to be moved manually
- If mechanical devices are not available, ask another person to assist you.
- Bend at the knees, not the waist. Let your legs do the lifting.
- Do not twist while lifting
- Bring the load as close to you as possible before lifting

- Be sure the path you are taking while carrying a heavy object is free of obstructions and slip, trip and fall hazards.

5.11 Slip, trip, and falls

5.11.1 Housekeeping

Maintaining a work environment that is free from accumulated debris is the key to preventing slip, trip and fall hazards at construction sites. Essential elements of good housekeeping include:

- Orderly placement of materials, tools and equipment,
- Placing trash receptacles at appropriate locations for the disposal of miscellaneous rubbish;
- Prompt removal and secure storage of items that are not needed to perform the immediate task at hand; and
- Awareness on the part of all employees to walk around, not over or on, equipment that may have been stored in the work area.

5.11.2 Work area obstructions

On any work area, it is expected that the ground may be uneven. The ground surface may be unreliable due to settling. Surface debris may be present and wet or swampy areas may exist.

Employees should walk around, not over or on top of debris or trash piles. When carrying equipment, identify a path that is clear of any obstructions. Employees should always follow an unobstructed path when accessing outdoor work locations as well due to the irregular terrain and the presence of heavy vegetation. It may be necessary to remove obstacles to create a smooth, unobstructed access point to the work areas on site.

During the winter months, snow shovels and salt crystals should be kept on site to keep paths and work areas free of accumulated snow and ice.

5.12 Thermal stress

Work at the site will be occurring during all seasons. Therefore, the hazards of cold and heat stress are addressed in this plan.

5.12.1 Cold stress

Cold injury is classified as either localized, as in frostbite, frostnip or chilblain; or generalized, as in hypothermia. The main factors contributing to cold injury are exposure to humidity and high winds, contact with wetness and inadequate clothing.

The likelihood of developing frostbite occurs when the face or extremities are exposed to a cold wind in addition to cold temperatures. The freezing point of the skin is about 30° F. Fluids around the cells of the body tissue freeze, causing the skin to turn white. This freezing is due to exposure to extremely low temperatures. As wind velocity increases, heat loss is greater and frostbite will occur more rapidly.

5.12.1.1 Symptoms of cold stress

The first symptom of frostbite is usually an uncomfortable sensation of coldness, followed by numbness. There may be a tingling, stinging or aching feeling in the effected area. The most vulnerable parts of the body are the nose, cheeks, ears, fingers and toes.

Symptoms of hypothermia, a condition of abnormally low body temperature, include uncontrollable shivering and sensations of cold. The heartbeat slows and may become irregular, the pulse weakens and the blood pressure changes. Pain in the extremities and severe shivering can be the first warning of dangerous exposure to cold.

Maximum severe shivering develops when the body temperature has fallen to 95° F. Take this as a sign of danger and remove employee from cold. Productive physical and mental work is limited when severe shivering occurs.

5.12.1.2 Methods to prevent cold stress

When the ambient temperature, or a wind chill equivalent, falls to below 40° F (American Conference of Governmental Industrial Hygienists recommendation), site personnel who must remain outdoors should wear insulated coveralls, insulated boot liners, hard hat helmet liners and insulated hand protection. Wool mittens are more efficient insulators than gloves. Keeping the head covered is very important, since 40% of body heat can be lost when the head is exposed. If it is not necessary to wear a hard hat, a wool knit cap provides the best head protection. A facemask may also be worn.

Persons should dress in several layers rather than one single heavy outer garment. The outer piece of clothing should ideally be wind and waterproof. Clothing made of thin cotton fabric or synthetic fabrics such as polypropylene is ideal since it helps to evaporate sweat. Polypropylene is best at wicking away moisture while still retaining its insulating properties. Loosely fitting clothing also aids in sweat evaporation. Denim is not a good protective fabric. It is loosely woven which allows moisture to penetrate. Socks with a high wool content are best. If two pairs of socks are worn, the inner sock should be smaller and made of cotton, polypropylene or a similar type of synthetic material that wick away moisture. If clothing becomes wet, it should be taken off immediately and a dry set of clothing put on.

If wind conditions become severe, it may become necessary to shield the work area temporarily. The SSO and the PM will determine if this type of action is necessary. Heated break trailers or a designated area that is heated should be available if work is performed continuously in the cold at temperatures, or equivalent wind chill temperatures, of 20° F.

Dehydration occurs in the cold environment and may increase the susceptibility of the worker to cold injury due to significant change in blood flow to the extremities. Drink plenty of fluids, but limit the intake of caffeine.

5.12.2 Heat stress

5.12.2.1 Types of heat stress

Heat related problems include heat rash, fainting, heat cramps, heat exhaustion and heat stroke. Heat rash can occur when sweat isn't allowed to evaporate; leaving the skin wet most of the time and making it subject to irritation. Fainting may occur when blood pools to lower parts of the body and as a result, does not return to the heart to be pumped to the brain. Heat related fainting often occurs during activities which require standing erect and immobile in the heat for long periods of time. Heat cramps are painful spasms of the muscles due to excessive salt loss associated with profuse sweating.

Heat exhaustion results from the loss of large amounts of fluid and the excessive loss of salt from profuse sweating. The skin will be clammy and moist and the affected individual may exhibit giddiness, nausea and headache.

Heat stroke occurs when the body's temperature regulatory system has failed. The skin is hot, dry, red and spotted. The affected person may be mentally confused and delirious. Convulsions could occur. **EARLY RECOGNITION AND TREATMENT OF HEAT STROKE ARE THE ONLY MEANS OF PREVENTING BRAIN DAMAGE OR DEATH.** A person exhibiting signs of heat stroke should be removed from the work area to a shaded area. The person should be soaked with water to promote evaporation. Fan the person's body to increase cooling.

Increased body temperature and physical discomfort also promote irritability and a decreased attention to the performance of hazardous tasks.

5.12.2.2 Early symptoms of heat-related health problems:

- Decline in task performance
- Incoordination
- Decline in alertness
- Unsteady walk
- Excessive fatigue
- Reduced vigilance
- Muscle cramps
- Dizziness

Susceptibility to heat stress increases due to:

- Lack of physical fitness
- Lack of acclimation
- Increased age
- Dehydration
- Obesity
- Drug or alcohol use
- Sunburn
- Infection

People unaccustomed to heat are particularly susceptible to heat fatigue. First timers in PPE need to gradually adjust to the heat.

The effect of personal protective equipment

Sweating normally cools the body as moisture is removed from the skin by evaporation. However, the wearing of certain personal protective equipment (PPE), particularly chemical protective coveralls (e.g., Tyvek), reduces the body's ability to evaporate sweat and thereby regulate heat buildup. The body's efforts to maintain an acceptable temperature can therefore become significantly impaired by the wearing of PPE.

Measures to avoid heat stress:

The following guidelines should be adhered to when working in hot environments:

- Establish work-rest cycles (short and frequent are more beneficial than long and seldom).
- Identify a shaded, cool rest area.
- Rotate personnel, alternative job functions.
- Water intake should be equal to the sweat produced. Most workers exposed to hot conditions drink fewer fluids than needed because of an insufficient thirst. **DO NOT DEPEND ON THIRST TO SIGNAL WHEN AND HOW MUCH TO DRINK.** For an 8-hour workday, 50 ounces of fluids should be drunk.
- Eat lightly salted foods or drink salted drinks such as Gatorade to replace lost salt.
- Save most strenuous tasks for non-peak heat hours such as the early morning or at night.
- Avoid alcohol during prolonged periods of heat. Alcohol will cause additional dehydration.
- Avoid double shifts and/or overtime.

The implementation and enforcement of the above mentioned measures will be the joint responsibility of the project manager, on-site field coordinator, and health and safety officer. Potable water and fruit juices should be made available each day for the field team.

Heat stress monitoring techniques

Site personnel should regularly monitor their heart rate as an indicator of heat strain by the following method:

Check radial pulse rates by using fore-and middle fingers and applying light pressure to the pulse in the wrist for one minute at the beginning of each rest cycle. If the pulse rate exceeds 110 beat/minute, shorten the next work cycle by one-third and keep the rest period the same. If, after the next rest period, the pulse rate still exceeds 110 beats per minute, shorten the work cycle by one-third.

5.13 Biological hazards

During the course of this sampling and monitoring program, there is the potential for workers to come in contact with biological hazards including poisonous plants and/or insects and animals.

5.13.1 Poisonous plants

Persons working on the site should be aware of the possible presence of poisonous plants and insects. Poison ivy is a climbing plant with leaves that consist of three glossy, greenish leaflets. Poison ivy has conspicuous red foliage in the fall. Small yellowish-white flowers appear in May through July at the lower leaf axils of the plant. White berries appear from August through November. Poison ivy is typically found east of the Rocky Mountains. Poison oak is similar to poison ivy but its leaves are oak-like in form. Poison oak occurs mainly in the south and southwest. Poison sumac typically occurs as a small tree or shrub and may be 6-20 feet in height. The bark is smooth, dark and speckled with darker spots. Poison sumac is typically found in swampy areas and east of the Mississippi. The leaves have 7-13 smooth-edged leaflets and drooping clusters of ivory-white berries appear in August and last through spring.

The leaves, roots, stems and fruit of these poisonous plants contain urushiol. Contact with the irritating oil causes an intensely itching skin rash and characteristic, blister-like lesions. The oil can be transmitted on soot particles when burned and may be carried on the fur of animals, equipment and apparel.

Proper identification of these plants is the key to preventing contact and subsequent dermatitis. Wear long sleeves and pants when working in wooded areas. In areas of known infestation, wear Tyvek coveralls and gloves. Oils are easily transferred from one surface to another. If you come in contact with these poisonous plants, wash all exposed areas immediately with cool water to remove the oils. Some commercial products such as Tecnu's Poison Oak-n-Ivy Cleanser claim to further help with the removal of oils.

5.13.2 Ticks

Ticks are bloodsuckers, attaching themselves to warm-blooded vertebrates to feed. Deer ticks, are associated with the transmission the bacteria that causes Lyme Disease. Female deer ticks are about one-quarter inch in length and are black and brick red in color. Males are smaller and all black. If a tick is not removed from the body, or if the tick is allowed to remain for days feeding on human blood, a condition known as tick paralysis can develop. This is due to a neurotoxin, which the tick apparently injects while engorging. This neurotoxin acts upon the spinal cord causing incoordination, weakness and paralysis.

The early stages of Lyme disease, which can develop within a week to a few weeks of the tick bite, are usually marked by one or more of these signs and symptoms:

- Tiredness

- Chills and fever
- Headache
- Muscle and/or joint pain
- Swollen lymph glands
- Characteristic skin rash (i.e., bull's-eye rash)

Tick season lasts from April through October; peak season is May through July. You can reduce your risk by taking these precautions:

- During outside activities, wear long sleeves and long pants tucked into socks. Wear a hat, and tie hair back.
- Use insecticides to repel or kill ticks. Repellents containing the compound DEET can be used on exposed skin except for the face, but they do not kill ticks and are not 100% effective in discouraging ticks from biting. Products containing permethrin kill ticks, but they cannot be used on the skin -- only on clothing. When using any of these chemicals, follow label directions carefully.
- After outdoor activities, perform a tick check. Check body areas where ticks are commonly found: behind the knees, between the fingers and toes, under the arms, in and behind the ears, and on the neck, hairline, and top of the head. Check places where clothing presses on the skin.
- Remove attached ticks promptly. Removing a tick before it has been attached for more than 24 hours greatly reduces the risk of infection. Use tweezers, and grab as closely to the skin as possible. Do not try to remove ticks by squeezing them, coating them with petroleum jelly, or burning them with a match.
- Report any of the above symptoms and all tick bites to the RHSM for evaluation.

5.13.3 Mosquito-borne illnesses

5.13.3.1 Eastern equine encephalitis

Eastern equine encephalitis is a rare disease that is spread to horses and humans by infected mosquitoes. It is among the most serious of a group of mosquito-borne virus diseases that can affect the central nervous system and cause severe complications and even death. Although relatively small outbreaks of human disease have occurred in the United States, the frequency of this disease is increasing with most cases reported from the eastern seaboard states, the Gulf Coast, and some inland Midwestern areas.

After infection, the virus invades the central nervous system, including the spinal cord and brain. Most people have no symptoms; others get only a mild flu-like illness with fever, headache, and sore throat. For people with infection of the central nervous system, a sudden fever and severe headache can be followed quickly by seizures and coma. About half of these patients die from the disease. Of those who survive, many suffer permanent brain damage and require lifetime institutional care. Symptoms usually appear 4 to 10 days after the bite of an infected mosquito. Confirming diagnosis is based on tests of blood or spinal fluid.

5.13.3.2 West Nile virus

West Nile encephalitis is an infection of the brain caused by the West Nile virus, which is transmitted by infected mosquitoes. Following transmission from an infected mosquito, West Nile virus multiplies in the person's blood system and crosses the blood-brain barrier to reach the brain. The virus interferes with normal central nervous system functioning and causes inflammation of the brain tissue. However, most infections are mild and symptoms include fever, headache and body aches. More severe infections may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis and rarely, death. Persons over the age of 50 have the highest risk of severe disease.

Prevention centers on public health action to control mosquitoes and on individual action to avoid mosquito bites. To avoid being bitten by the mosquitoes that cause the disease, use the following control measures:

- If possible, stay inside between dusk and dark. This is when mosquitoes are most active.
- When outside between dusk and dark, wear long pants and long-sleeved shirts.
- Spray exposed skin with an insect repellent, preferably containing DEET.

6.0 Air monitoring

6.1 Direct reading instruments

Metals and PAH compounds which may be present in soils are not volatile. Neither are PCBs and pesticides/herbicides. Therefore, the potential for exposure to these contaminants is via the inhalation of dusts. To protect employees from this potential exposure route, a light mist of water can be applied over any areas where dusts are generated, if necessary.

To determine potential exposures to petroleum and/or chlorinated hydrocarbons during the proposed scope of work, ENSR will screen the breathing zone of employees with a photoionization detector (PID) as described below.

Instrument 1 - RaeSystems Mini-Rae 2000 PID with a 10.6 eV lamp and/or ppb Rae meter

A Rae Systems Mini-Rae 2000 PID with a 10.6 eV lamp and/or a ppb Rae meter will be used to monitor the breathing zone of personnel during subsurface activities. This unit will detect the presence of both petroleum and chlorinated hydrocarbons. When the PID indicates sustained (15 minute) breathing zone vapor concentrations in excess of 15 units or more, respiratory protection, as described in Section 7.2 of this document, will be donned. This action level is based on the ACGIH TLV of 25 ppm (2,500 ppb) for PCE and its reported response to the selected unit. This action limit will also protect employees from exposure to the other chlorinated compounds and petroleum hydrocarbons.

Instrument 2 – Multi-gas meter

A multi-gas meter will be used when soil borings are advanced in the Old Landfill. The predominant potential concern is the presence of methane, which is a highly flammable gas. Although not expected, if the combustible gas sensor on the unit exceeds 10% of the lower explosive limit (LEL) of methane, drilling will be temporarily suspended until concentrations subside. Assuming concentrations do subside to below 10% of the LEL, drilling can resume. If LEL concentrations do not subside, the SSO will contact the RHSM to determine an appropriate course of action before resuming drilling operations.

6.2 Personal air sampling

Personal air sampling will not be conducted by ENSR during the activities covered by this HASP.

6.3 Calibration and recordkeeping

Equipment used by ENSR will be calibrated in accordance with the quality assurance plan and ENSR's standard operating procedures. A log of PID and multi-gas readings will be kept in the field notebook. Daily calibration information will also be recorded in the field notebook.

7.0 Personal protective equipment

Personal protective equipment (PPE) will be worn during these activities to prevent on-site personnel from being injured by the safety hazards posed by the site and/or the activities being performed. In addition, chemical protective clothing will be worn to prevent direct dermal contact with the site's chemical contaminants. The following table describes the PPE and chemical protective clothing to be worn for general site activities and for certain specific tasks.

7.1 Chemical protective clothing

PPE Item	Drilling	Soil and Groundwater Sampling	Excavation
Hard Hat	✓	✓	✓
Steel Toed Safety Shoes	✓	✓	✓
Safety Glasses with Sideshields	✓	✓	✓
ANSI-approved Class II traffic vests	If working in high traffic areas	If working in high traffic areas	✓
Outer Nitrile Gloves with inner Latex liners	When collecting soil samples	✓	✓
Kevlar™ gloves	When drilling and cutting open acetate soil liners	When cutting tubing with knife	
Hearing Protection	✓		✓

7.2 Respiratory protection

ENSR will perform air monitoring in the worker's breathing zone during the subsurface investigation. If the PID indicates sustained (15 minutes) breathing zone VOC concentrations of 15 units or more, Level C respiratory protection will be donned.

Level C Specification: Half-mask air-purifying respirator with organic vapor cartridges

All employees who are expected to don respiratory protection must have successfully passed a fit-test within the past year for the brand, model and size respirator they plan to wear on this program.

7.3 Other safety equipment

The following additional safety items should be available at the site:

- Portable, hand-held eyewash bottles and a first aid kit
- Type A-B-C fire extinguisher (located on the drill rig)
- Portable phones

8.0 Site control and decontamination

To prevent both exposure of unprotected personnel and migration of contamination due to tracking by personnel or equipment, hazardous work areas will be clearly identified and decontamination procedures will be required for personnel and equipment leaving those areas.

8.1 Site Control

8.1.1 Designation of zones

ENSR designates work areas or zones as suggested in the "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities," NIOSH/OSHA/USCG/EPA, November 1985. They recommend that the areas surrounding each of the work areas to be divided into three zones:

- Exclusion or "Hot" Zone
- Contamination Reduction Zone (CRZ)
- Support Zone

8.1.1.1 Exclusion zone

An exclusion zone will be established around the drilling areas. The perimeter of the exclusion zone will be marked with caution tape or indicated by traffic cones so that employees and patrons of the site are aware of the work being conducted.

All ENSR personnel entering these work areas must wear the prescribed level of protective equipment.

8.1.1.2 Contamination reduction zone

A mini-decontamination zone will be established adjacent to each work area. Personnel will remove contaminated gloves and other disposable items in this area and place them in a plastic bag until they can be properly disposed of.

8.1.1.3 Support zone

At this site the support zone will include the area outside of the exclusion zone.

8.1.2 General site safety practices

The following measures are designed to augment the specific health and safety guidelines provided in this plan.

- The "buddy system" will be used at all times by all field personnel. No one is to perform field work alone. Standby team member must be intimately familiar with the procedures for initiating an emergency response.
- Eating, drinking, chewing gum or tobacco, smoking or any practice that increases the probability of hand-to-mouth transfer and ingestion of materials is prohibited in the immediate work area and the decontamination zone.
- Smoking is prohibited in all work areas. Matches and lighters are not allowed in these areas.

- Hands and face must be thoroughly washed upon leaving the work area and before eating, drinking or any other activities.
- Beards or other facial hair that interfere with respirator fit are prohibited.
- The use of alcohol or illicit drugs is prohibited during the conduct of field operations.
- All equipment must be decontaminated or properly discarded before leaving the site in accordance with the project work plan.

8.2 Personal Decontamination

Proper decontamination is required of all personnel before leaving the exclusion zone. Decontamination will occur within the contamination reduction zone. Disposable PPE, such as gloves, will be removed in the decontamination reduction zone and placed in garbage bags for disposal as general refuse.

Regardless of the type of decontamination system required, as a minimum, a container of potable water and liquid soap should be made available so employees can wash their hands and face before leaving the site for lunch or for the day. Employees should always wash their face and hands with soap and water before eating, smoking or drinking.

If worn, respirators will be cleaned after each use with respirator wipe pads and will be stored in plastic bags after cleaning.

9.0 Medical monitoring and training requirements

9.1 Medical monitoring

All personnel performing activities covered by this HASP must be active participants in a medical monitoring program that complies with 29 CFR 1910.120(f). Each individual must have completed an annual surveillance examination and/or an initial baseline examination within the last year prior to performing any work on the site covered by this HASP.

9.2 Health and safety training

9.2.1 HAZWOPER

All personnel performing activities covered by this HASP must have completed the appropriate training requirements specified in 29 CFR 1910.120 (e). Each individual must have completed an annual 8-hour refresher training course and/or initial 40-hour training course within the last year prior to performing any work on the sites covered by this HASP.

9.2.2 Pre-entry briefing

Prior to the commencement of on-site activities, a pre-entry briefing will be conducted by the SSO to review the specific requirements of this HASP. Attendance of the pre-entry meeting is mandatory for all personnel covered by this HASP and must be documented on the attendance form provided in Attachment C. HASP sign-off sheets should also be collected at the time of the pre-entry briefing. All documentation should be maintained in the project file.

9.2.3 Daily safety meetings

All members of each sampling team will meet at the beginning of each day to review the scope of work for each team and the locations that they will be working at. During this work scope meeting, each team will report on any safety issues that occurred during the previous day's work and review appropriate control measures with the teams.

10.0 Emergency response

OSHA defines emergency response as any "response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual-aid groups, local fire departments, etc.) to an occurrence which results, or is likely to result in an uncontrolled release of a hazardous substance." According to ENSR policy, ENSR personnel shall not participate in any emergency response where there are potential safety or health hazards (i.e., fire, explosion, or chemical exposure). ENSR response actions will be limited to evacuation and medical/first aid as described within this section below. As such this section is written to comply with the requirements of 29 CFR 1910.38 (a).

The basic elements of an emergency evacuation plan include:

- Employee training,
- Alarm systems,
- Escape routes,
- Escape procedures,
- Critical operations or equipment,
- Rescue and medical duty assignments,
- Designation of responsible parties,
- Emergency reporting procedures and
- Methods to account for all employees after evacuation.

10.1 Employee training

Employees must be instructed in the site-specific aspects of emergency evacuation. On-site refresher or update training is required anytime escape routes or procedures are modified or personnel assignments are changed.

10.2 Alarm system/emergency signals

An emergency communication system must be in effect at all sites. The most simple and effective emergency communication system in many situations will be direct verbal communications. Each site must be assessed at the time of initial site activity and periodically as the work progresses. Verbal communications must be supplemented anytime voices can not be clearly perceived above ambient noise levels (i.e., noise from heavy equipment; drilling rigs, backhoes, etc.) and anytime a clear line-of-sight can not be easily maintained amongst all ENSR personnel because of distance, terrain or other obstructions.

Verbal communications will be adequate to warn employees of hazards associated with the immediate work area. The property is occupied but ENSR may not have access to facility phones. Therefore, ENSR will bring a portable phone to the site to ensure that communications with local emergency responders is maintained, when necessary.

10.3 Escape routes and procedures

During an on-site emergency, ENSR employees will leave the site via Memorial Highway Road. All personnel on site are responsible for knowing the escape route from the site and where to assemble after evacuation.

10.4 Rescue and medical duty assignments

The phone numbers of the police and fire departments, ambulance service, local hospital, and ENSR representatives are provided in the emergency reference sheet. This sheet will be posted in the site vehicle.

In the event an injury or illness requires more than first aid treatment, the SSO will accompany the injured person to the medical facility and will remain with the person until release or admittance is determined. The escort will relay all appropriate medical information to the on-site project manager and the RHSM.

If the injured employee can be moved from the accident area, he or she will be brought to the CRZ where their PPE will be removed. If the person is suffering from a back or neck injury the person will not be moved and the requirements for decontamination do not apply. The SSO must familiarize the responding emergency personnel about the nature of the site and the injury. If the responder feels that the PPE can be cut away from the injured person's body, this will be done on-site. If this not feasible, decontamination will be performed after the injured person has been stabilized.

10.5 Designation of responsible parties

The SSO is responsible for initiating emergency response. In the event the SSO can not fulfill this duty, the alternate SSO will take charge.

10.6 Employee accounting method

The SSO is responsible for identifying all ENSR personnel on-site at all times. On small, short duration jobs this can be done informally as long as accurate accounting is possible.

10.7 Accident reporting and investigation

Any incident (other than minor first aid treatment) resulting in injury, illness or property damage requires an accident investigation and report. The investigation should be conducted as soon as emergency conditions are under control. The purpose of the investigation is not to attribute blame but to determine the pertinent facts so that repeat or similar occurrences can be avoided. An ENSR accident investigation form is presented in Attachment D of this HASP. The injured ENSR employee's supervisor and the RHSM should be notified immediately of the injury.

If a subcontractor employee is injured, they are required to notify the ENSR SSO. Once the incident is under control, the subcontractor will submit a copy of their company's accident investigation report to the ENSR SSO.

Emergency References

Ambulance: 911

Fire: 911

Police: 911

Medical Services: 908-859-6700
Warren Hospital
185 Roseberry St
Phillipsburg, NJ

Directions to Hospital: Head west on US 22 West (Memorial Pkwy) towards NJ 57 West/Memorial Pkwy. Take the Roseberry Street ramp towards Belvidere. Turn slight right onto Roseberry Street. Warren Hospital is within 0.2 miles after the turn on Roseberry Street.

On Site Telephone: (908) 864-5149. The property is occupied. ENSR has access to facility phone(s). Additionally, ENSR employees have cell phone access.

Underground Utility Location Service: (800)-272-1000

ENSR Project Representatives:

ENSR/Lamghorne, PA 215-757-4900

-John McCartney (RHSM) x 244

ENSR/Piscataway, NJ 732-981-0200

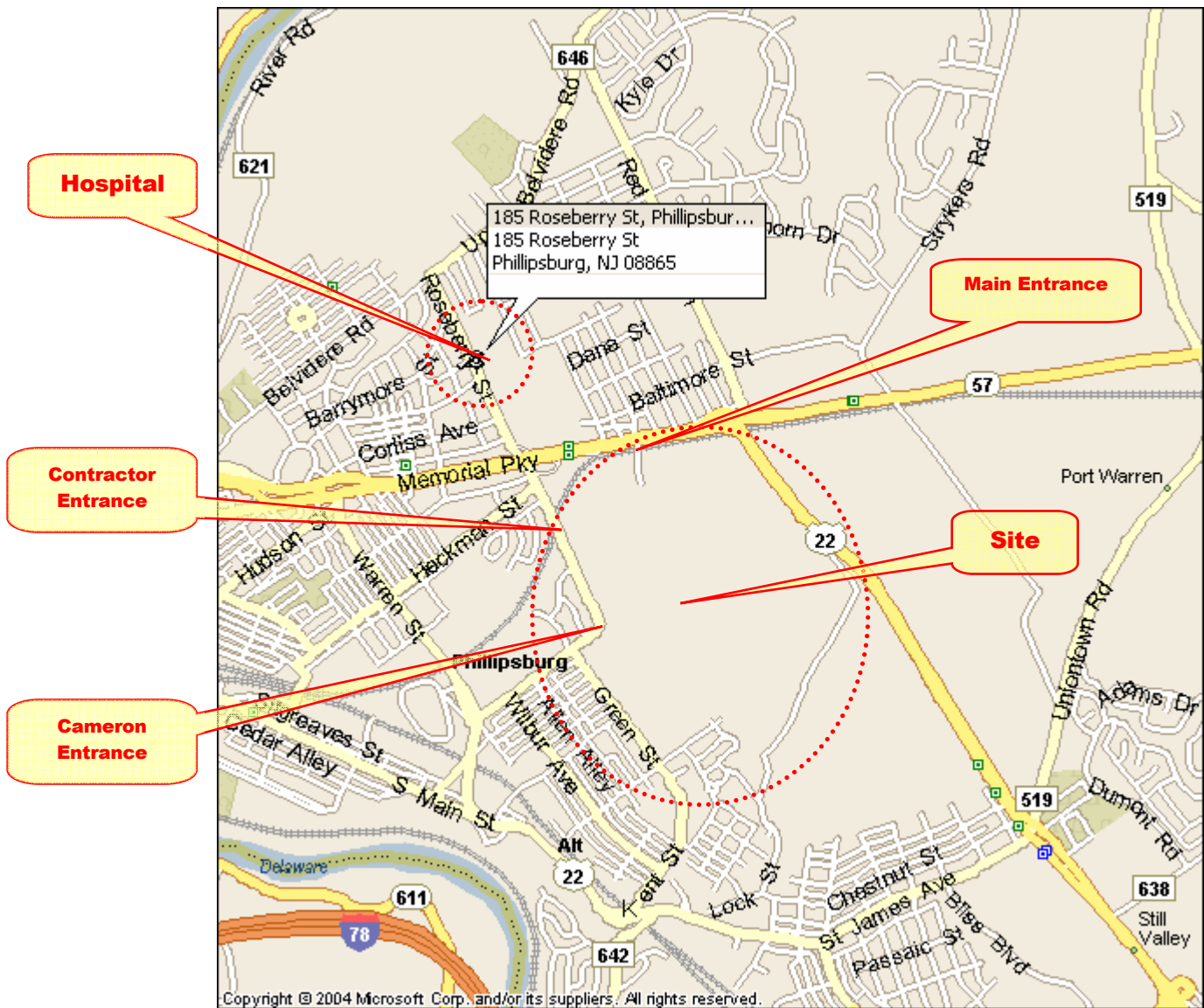
-Gregg Micalizio (PM) x3131

Cell 732-319-4727

-Anthony Kwiec (SSO) Cell 978-273-4634

-Nadia Oliveira (Asst. PM) x3012
Cell 732-770-9222

Route from Site to Warren Hospital
185 Roseberry Street
Phillipsburg, New Jersey



Tables

Table 1 - List of Areas of Concern

TABLE 1
SUMMARY AND STATUS OF AREAS OF CONCERN

Former Ingersoll Rand Company Facility
Phillipsburg, New Jersey

AOC	DESCRIPTION	CONTAMINANTS OF CONCERN	NFA STATUS	REFERENCE	PROPOSED ACTIVITIES	SCHEDULE
AOC- 1	Transformer (removed) East End Bldg. #12	TPHC and PCB	---	SI Sampling of TPHC and PCB reported in October 23, 1997 AOC-1 Field Sampling Summary Report.	Delineation Sampling (Completed) and Deed Notice.	Investigation - 11/2003 Deed Notice - 3/2005
AOC-2	Spray Pond Sludge Disposal Area	TPHC and PCB	---	Waste classification sampling plan submitted to NJDEP on July 11, 2003.	Waste Classification Sampling (Completed), Excavation and offsite disposal, post-excavation sampling.	RI Sampling - 11/2003 Excavation - 3/2005 PE Sampling - 4/2005
AOC-3a	Former Chip Storage Area - Cameron East End Bldg. 252	No Exceedances of Applicable Criteria	NFA Granted	NJDEP May 14, 2002 letter.	No further action proposed in May 2000 SI/RI Report, February 2001 RI Addendum, May 2001 SI/RI Report, and January 2002 RI Report.	N/A
AOC-3b	Former Chip Storage Area - Cameron South Side Bldg. 252	No Exceedances of Applicable Criteria	NFA Granted	NJDEP May 14, 2002 letter.	No further action proposed in May 2000 SI/RI Report, February 2001 RI Addendum, May 2001 SI/RI Report, and January 2002 RI Report.	N/A
AOC-3c	Former Chip Storage Area- West of Bldg. 91	PAHs, PCBs, Arsenic, Copper, and Lead	---	SI Completed, Delineation soil sampling required.	Delineation Sampling (Completed) and Deed Notice.	Investigation - 11/2003 Deed Notice - 3/2005
AOC-3d	Former Chip Storage Area- South of Bldg. 55	PAHs, PCBs, Arsenic, Copper, and Lead	---	SI Completed, Delineation soil sampling required.	Delineation Sampling (Completed) and Deed Notice.	Investigation - 11/2003 Deed Notice - 3/2005
AOC-3e	Former Chip Storage Area- West Bldg. 17b	No Sampling conducted	---	NJDEP October 18, 1994 letter.	Investigate (Completed) and deed notice as may be necessary.	Investigation - 11/2003 Deed Notice (if nec.) - 3/2005
AOC-3f	Former Chip Storage Area- North of Bldg. 17a	PCB and Arsenic	---	SI Completed, Delineation soil sampling required.	Investigate (Completed) as proposed in 1994 RIWP, Deed Notice	Investigation - 11/2003 Deed Notice - 3/2005
AOC-4	Three Round Concrete Tanks - North of Bldg. 17a	No Exceedances of Applicable Criteria	NFA Granted	NJDEP January 23, 1997 letter.	No further action proposed in October 1996 UST Closure Report.	N/A
AOC-5	Contaminated Soil Piles- East of Bldg. 17b.	No Sampling conducted	---	Reduced sampling scope requested in July 11, 2003 letter to NJDEP.	Conduct Sampling (Completed), Reuse soil onsite.	Investigation - 11/2003 Soil Reuse Plan - 3/2005 SRP Implementation - 9/2005
AOC-6	Cameron Coolant Disposal Area	No Sampling has been conducted to date (AOC was not located)	NFA Conditionally Granted	NJDEP October 18, 1994 letter.	No further action proposed in 1994 Draft RIWP.	N/A
AOC-7	Three UST's (Fuel Oil) - Bldg. 13 (Abandon In-place)	No Exceedances of Applicable Criteria	NFA Granted	NJDEP January 23, 1997 letter.	No further action proposed in October 1996 UST Closure Report.	N/A
AOC-8	500 Gallon Gasoline Tank - NW Corner Bldg. 263 (removed)	No Exceedances of Applicable Criteria	NFA Granted	NJDEP January 23, 1997 letter.	No further action proposed in October 1996 UST Closure Report.	N/A
AOC-9	10,000 Gallon UST (Diesel Oil) - East of Bldg. 12 (Abandon In-place - 1983)	No Exceedances of Applicable Criteria	NFA Granted	NJDEP January 23, 1997 letter.	No further action proposed in October 1996 UST Closure Report.	N/A
AOC-10	Bldg. 14- (Former Heat Treat Bldg.)	PCE , TCE, Arsenic, Beryllium, Lead, and Thallium	NFA Conditionally Granted	NJDEP August 2, 2000 letter.	No further action proposed in February 2000 Remedial Investigation Report. NFA requires incorporation into Deed Notice.	Deed Notice - 3/2005
AOC-11	One 10,000 Gallon UST - (Methanol) South of Bldg. 14 (demolished)	No Exceedances of Applicable Criteria	NFA Granted	NJDEP August 2, 2000 letter.	No further action proposed in February 2000 Remedial Investigation Report.	N/A
AOC-12	Two 10,000 Gallon UST's (Quenching Oil) South of Bldg. 14 (demolished)	TPHC, PAHs, and Beryllium	---	February 2000 Remedial Investigation Report	Additional soil investigation including soil delineation (Completed) and possible LNAPL recovery,	Investigation - 11/2003 RAW - 9/2005
AOC-13	One 500 Gallon UST (Gasoline) South of Bldg. 14 (assumed removed could not locate)	N/A - Tank never located, assumed to have been removed.	NFA Granted	NJDEP January 23, 1997 letter.	No further action proposed in October 1996 UST Closure Report.	N/A
AOC-14	One 500 Gallon UST (Benzene) North of Bldg. 14 (assumed removed- could not locate)	No Exceedances of Applicable Criteria	NFA Granted	NJDEP January 23, 1997 letter.	No further action proposed in October 1996 UST Closure Report.	N/A
AOC-15	Two 1000 Gallon UST's (Diesel & Lube Oil) - North of Bldg. 8	No Exceedances of Applicable Criteria	NFA Granted	NJDEP January 23, 1997 letter.	No further action proposed in October 1996 UST Closure Report.	N/A
AOC-16	Bldg. 17 - Former Drill Manufacturing Bldg.	No Sampling has been conducted to date	---	June 1994 Draft Remedial Investigation Workplan	Sample grid and delineate as necessary (Completed), Incorporate into Deed Notice if warranted.	Investigation - 11/2003
AOC-17	Former location of Iron Foundry	TPHC, PAHs, and Beryllium	---	May 2001 SI/RI Report	Delineation soil sampling (Completed), Incorporate into Deed Notice.	Investigation - 11/2003 Deed Notice - 3/2005

TABLE 1
SUMMARY AND STATUS OF AREAS OF CONCERN

Former Ingersoll Rand Company Facility
Phillipsburg, New Jersey

AOC	DESCRIPTION	CONTAMINANTS OF CONCERN	NFA STATUS	REFERENCE	PROPOSED ACTIVITIES	SCHEDULE
AOC-18	Monitoring Wells 5,24, & 26 Area	LNAPL	---	February 2002 Groundwater Remedial Investigation Workplan	Free Product Recovery and continued monitoring. Possible Classification Exception Area for groundwater beneath site.	GW Monitoring occurs semiannually, RAW expected in 2006 to include a CEA.
AOC-19	1500 Gallon Waste Oil Tank- Bldg. 12 Air Trappage Tank	TPHC, PCE, PAHs, Arsenic, and Copper	---	June 1994 Draft Remedial Investigation Workplan.	Review existing data conduct sampling (Completed), include in Deed Notice	Investigation - 11/2003 Deed Notice - 3/2005
AOC-20	5000 Gallon Waste Oil Tank in Bldg. 12	No sampling required under ISRA	NFA Granted	NJDEP October 18, 1994 letter.	No further action proposed in June 1994 Draft Remedial Investigation Workplan.	N/A
AOC-21	1750 Gallon AST Waste Coolant Tank South of Bldg. 9	No sampling required under ISRA	NFA Granted	NJDEP October 18, 1994 letter.	No further action proposed in June 1994 Draft Remedial Investigation Workplan.	N/A
AOC-22	600 Gallon AST - Brill Skimmer	No sampling required under ISRA	NFA Granted	NJDEP March 28, 1995 letter.	No further action proposed in June 1994 Draft Remedial Investigation Workplan.	N/A
AOC-23	Incinerator Site (1976-74) South End of Spray Pond	PAHs, Copper, and Nickel	---	ENSR September 2002 AOC-23, 33, & 34 Site Investigation Report; NJDEP December 19, 2002 Letter.	Conduct RI sampling (Completed), Deed Notice	Investigation - 11/2003 Deed Notice - 3/2005
AOC-24	One 2000 Gallon Process Tank - Bldg. 12	No sampling required under ISRA	NFA Granted	NJDEP October 18, 1994 letter.	No further action proposed in June 1994 Draft Remedial Investigation Workplan.	N/A
AOC-25	Two 10,000 Gallon UST's - Southwest Bldg. 17 (certified & removed)	No sampling required under ISRA	NFA Granted	NJDEP October 18, 1994 letter.	No further action proposed in June 1994 Draft Remedial Investigation Workplan.	N/A
AOC-26	One 2000 Gallon UST - South Bldg. 254 (certified & removed)	No Current Exceedances of Applicable Criteria	NFA Granted	NJDEP October 18, 1994 and May 14, 2002 letters.	No further action proposed in June 1994 Draft Remedial Investigation Workplan.	N/A
AOC-27	Hazardous Waste Storage Shed - East Bldg. 12	No sampling required under ISRA	NFA Granted	NJDEP October 18, 1994 letter.	No further action proposed in June 1994 Draft Remedial Investigation Workplan.	N/A
AOC-28	Ultrafilter in Bldg. 12	No sampling required under ISRA	NFA Granted	NJDEP October 18, 1994 letter.	No further action proposed in June 1994 Draft Remedial Investigation Workplan.	N/A
AOC-29	Old Landfill	TPHC, PAHs, PCBs, Antimony, Arsenic, Beryllium, Cadmium, Copper, Lead, Nickel, and Zinc	NFA Conditionally Granted	ENSR May 2001 AOC-3a, 3b, 26, 29, 31, & 37 Site/Remedial Investigation Report; NJDEP March 6, 2002 letter; NJDEP September 10, 2002 letter.	Prepare RAW and Draft Deed Notice, Cover.	RAW and Draft DN - 3/2005 Cover - 2006
AOC-30	Sludge in bottom of Spray Pond	TPHC, PAHs, PCBs, Arsenic, Copper, Lead, Mercury, Nickel, and Zinc	requested	IDP Letter to NJDEP dated December 20, 1999; April 1996 Field Sampling Summary Report AOC-30.	Sludge removal as part of routine maintenance	N/A
AOC-31	Two Lined Inverse Ponds	TPHC, PAHs, Arsenic, Beryllium, Copper, Lead, Mercury, Nickel, and Zinc	---	2002 AOC-31 Inverse Ponds Site/ Remedial Investigation Report; May 2001 Site/Remedial Investigation Report for AOCs 3a, 3b, 26, 29, 31, & 37.	Evaluate pond closure and removal options and conduct remedial investigation activities. Excavate and dispose, and/or deed notice.	Close ponds - 6/2006 Investigation - 9/2006 RAW - 6/2007 RA/DN - 2008
AOC-32	Two Unlined Lagoons	No Sampling has been conducted to date	NFA Granted	NJDEP March 28, 1995 letter.	No further action proposed in June 1994 Draft Remedial Investigation Workplan.	N/A
AOC-33	Incinerator - North of Bldg. 17b	TPHC and Arsenic	---	ENSR September 2002 AOC-23, 33, & 34 Site Investigation Report; NJDEP December 19, 2002 Letter.	RI Activities (Completed), Deed Notice	Investigation - 11/2003 Deed Notice - 3/2005
AOC-34	Incinerator - West Corner of Bldg. 22	PAHs	---	ENSR September 2002 AOC-23, 33, & 34 Site Investigation Report; NJDEP December 19, 2002 Letter.	RI Activities (Completed), Deed Notice	Investigation - 11/2003 Deed Notice - 3/2005
AOC-35	1000 Gallon UST (Diesel Oil) Tank - East of Bldg. 12 (removed)	No Current Exceedances of Applicable Criteria	NFA Granted	NJDEP April 11, 2000 Letter.	No further action proposed in August 1995 RI/RA Report and July 13 1998 letter to NJDEP.	N/A
AOC-36	Contaminated Soil Piles - South of Bldg. 111 - Stockpiled in early 1990s during excavation for site modification	No Sampling Conducted To Date	---	Reduced sampling scope requested in July 11, 2003 letter to NJDEP,	Conduct Sampling (Completed), Soil Reuse onsite	Investigation - 11/2003 Soil Reuse Plan - 3/2005 SRP Implementation - 9/2005
AOC-37	Ephemeral Stream	Arsenic	NFA Granted	NJDEP May 14, 2002 Letter.	No Further Action - Deed Notice proposed in the May 2001 Site/Remedial Investigation Report for AOCs 3a, 3b, 26, 29, 31, & 37.	Deed Notice - 3/2005
AOC- 38	Buried No. 2 & 6 Fuel Oil Pipelines	TPHC	NFA Granted	NJDEP April 11, 2000 Letter.	No Further Action proposed in the July 1995 Status of the Remedial Investigation/Remedial Action on the Buried No. 2 and No. 6 Fuel Oil Lines and the August 1995 Report of Soil Investigation at AOC-28 and AOC-35.	N/A
AOC- 39	Scrap Pad - South Bldg. 24	TPHC and PAHs	---	IDP Letter to NJDEP dated October 27, 1997	Conduct RI sampling (Completed), Deed Notice	Investigation - 11/2003 Deed Notice - 3/2005

TABLE 1
SUMMARY AND STATUS OF AREAS OF CONCERN

Former Ingersoll Rand Company Facility
Phillipsburg, New Jersey

AOC	DESCRIPTION	CONTAMINANTS OF CONCERN	NFA STATUS	REFERENCE	PROPOSED ACTIVITIES	SCHEDULE
AOC- 40	Concrete Structure near former Rock Drill Bldg.	No Current Exceedances of Applicable Criteria	requested	IDP's October 1999 letter to NJDEP.	No Further Action Proposed in the October 1999 Progress Report.	N/A
AOC-41	Spill at Separator Building	TPHC	---	June 2000 Progress Report and Report of Spill at Separator Bldg.	Conduct RI sampling (Completed), Deed Notice or excavate.	Investigation - 11/2003 Deed Notice or RAW - 3/2005
AOC-42	Groundwater - West Side of Fuel Oil Plume	Select Chlorinated Volatile Organic Compounds	---	Ongoing monitoring per February 2002 Groundwater Remedial Investigation Workplan.	Continue Monitoring as required. Possible Classification Exception Area for groundwater beneath site.	Sampling conducted semiannually. RAW expected in 2006 to include a CEA.
AOC-43	Groundwater - LNAPL Plume	LNAPL	---	Ongoing remediation and monitoring per February 2002 Groundwater Remedial Investigation Workplan.	Continued Product Recovery and monitoring with development of Remedial Action Workplan and Classification Exception Area proposal.	LNAPL Recovery ongoing with continuing modifications to on site recovery system. RAW scheduled for 2006 to include a CEA.
AOC-44	Groundwater - Dissolved Phase	Select Chlorinated Volatile Organic Compounds and Metals	---	Ongoing monitoring per February 2002 Groundwater Remedial Investigation Workplan.	Continued monitoring and delineation activities with development of Remedial Action Workplan and Classification Exception Area proposal.	Sampling conducted semiannually. RAW expected in 2006 to include a CEA.
AOC-45	Pits in Building #16	2003/2004 sampling indicated chlorinated organics and metals.	---	Identified in internal memorandum Re: Regulatory Applicability of potential tenant Blue Ridge Steel	Collect SI Samples per Tech Regs (Completed). - Based on results, a well was also installed.	Investigation - 11/2003 Deed Notice - 3/2005

Updated May 28, 2004

NOTES:

AOC = Area of Concern
CEA = Classification Exception Area
DN = Deed Notice
GW = Groundwater
IDP = Ingersoll Dresser Pump Co.
ISRA = Industrial Site Recovery Act
LNAPL = Lighter than water Non-Aqueous Phase Liquid
N/A = Not Applicable
NFA = No Further Action
NJDEP = New Jersey Department of Environmental Protection
PAH = Polycyclic Aromatic Hydrocarbons

PCB = Polychlorinated Biphenyls
PCE = Tetrachloroethylene
PE = Post Excavation
RAW = Remedial Action Workplan
RI = Remedial Investigation
RIWP = Remedial Investigation Workplan
SI = Site Investigation
SRP = Soil Reuse Plan
TCE = Trichloroethylene
TPHC = Total Petroleum Hydrocarbons

TABLE 1
SUMMARY OF NEWLY IDENTIFIED AREAS OF CONCERN

Former Ingersoll Rand Company Facility
Phillipsburg, New Jersey

AOC	DESCRIPTION	CONTAMINANTS OF CONCERN ⁽¹⁾	NFA STATUS	REFERENCE	PROPOSED ACTIVITIES	SCHEDULE
AOC-46	Coal Trestle / Former Coal Storage Area(s)	PAH/BN, Metals	---	Forthcoming Report	Sample and incorporate into Deed Notice	SI sampling - 6/04
AOC-47	Locations of Former X-Ray Machines	Radionuclides	---	Forthcoming Report	Conduct Rad survey	Rad Survey - 6/04
AOC-48	Former Mine	---	---	Forthcoming Report	Discuss investigation strategy with NJDEP	to be determined
AOC-49	Transformers - Historic and Current	TPHC, PCB	---	Forthcoming Report	Assess locations of these operations in relation to previously conducted sampling	to be determined
AOC-50	Dry Wells, Cesspools, Pits, & Leach Fields	---	---	Forthcoming Report	Sample to verify clean closure	to be determined
AOC-51	Onsite Ponds (current and historic)	---	---	Forthcoming Report	Sample to verify clean closure	to be determined
AOC-52	Building sumps, pits, floor drains	---	---	Forthcoming Report	Determine construction type	to be determined
AOC-53	Subsurface Utilities	---	---	Forthcoming Report	Assess locations of these operations in relation to previously conducted sampling	to be determined
AOC-54	ASTs/USTs (including bulk storage tank farm) not previously investigated	---	---	Forthcoming Report	Sample to verify clean closure	to be determined
AOC-55	Rail lines	---	---	Forthcoming Report	Map locations based on historic information and incorporate into Deed Notice.	to be determined
AOC-56	Plating Operations	---	---	Forthcoming Report	Assess location of these operations in relation to previously conducted sampling	to be determined
AOC-57	Boilers, ovens, furnaces, and Incinerators	---	---	Forthcoming Report	Assess location of these operations in relation to previously conducted sampling	to be determined
AOC-58	Fill	PAH, Metals	---	Forthcoming Report	Map locations based on historic information and incorporate into Deed Notice.	to be determined
AOC-59	Roof/Process Vents and Roof Drains	---	---	Forthcoming Report	Assess location of these operations in relation to previously conducted sampling	to be determined
AOC-60	Scrap Pads, Storage Areas, and Process Areas	---	---	Forthcoming Report	Assess location of these operations in relation to previously conducted sampling	to be determined

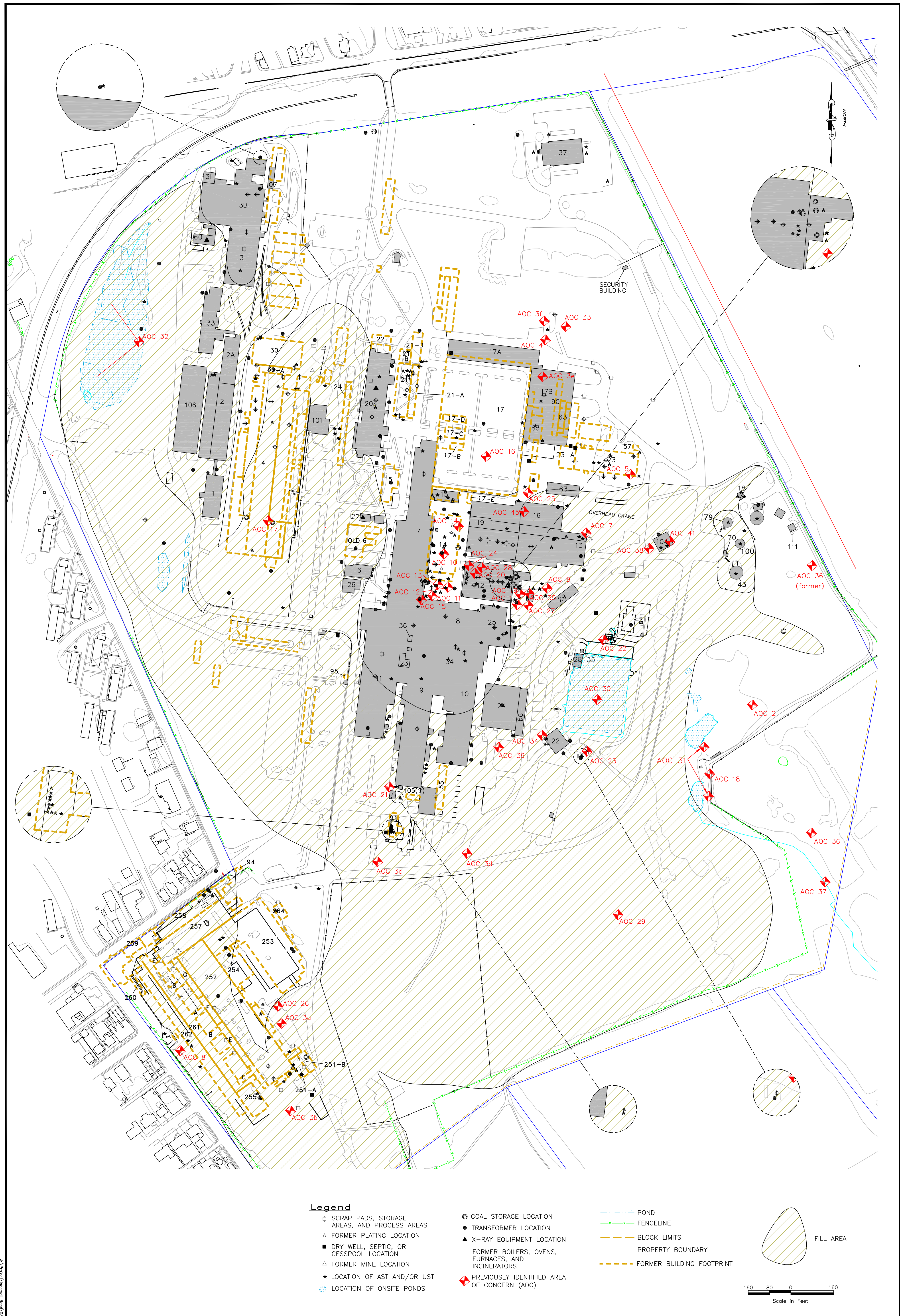
NOTES:

The potential AOCs listed above have been identified based on the historic review currently in progress. Specific locations of identified areas will be provided as the historic review progresses.

(1) All indicated COCs are presumed based on anticipated sampling parameters or previously known impacts of similar AOCs.

Figures

Figure 1 – Locations of Areas of Concern



Attachment A

Health and Safety Plan Receipt and Acceptance Form

Health and Safety Plan Receipt and Acceptance Form

**Soil and Groundwater and Remediation
Former Ingersoll Rand Company Facility
942 Memorial Highway
Phillipsburg, New Jersey**

I have received a copy of the Health and Safety Plan prepared for the above-referenced site and activities. I have read and understood its contents and I agree that I will abide by its requirements.

Name: _____

Signature: _____

Date: _____

Representing: _____

Attachment B

Job Hazard Analysis Form

STANDARD OPERATING PROCEDURES JOB HAZARD ANALYSIS

Project: Former Ingersoll Rand Company Facility in Phillipsburg, NJ

Author: Mary Beaton/Nadia Oliveira

Last Revision: March 9, 2006

The following is a step-by-step process to conduct and distribute job hazard analyses.

Purpose of Job Hazard Analyses

A Job Hazard Analysis (JHA) is used to define health and safety hazards for each step during a task ("job"). A Job Hazard Analysis Form can be used in three ways:

- as the basis for constructing a new Health and Safety Plan (HASP);
- as an official addendum to the HASP for tasks that were not included originally in the HASP. JHA forms for new tasks will be approved by the Regional Health and Safety (H&S) Coordinator. The ENSR Piscataway office updates the HASP once a year, and will use JHA forms to update the HASP for relevant tasks not included in the HASP; or
- as a stand-alone guidance document for field personnel.

For those projects that have a composed HASP, JHA forms will be used in the process of updating the HASP(s) and as guidance documents for use during field tasks.

Procedures for Assigning the Completion of the JHAs

Prior to the start of a job (preferably a month before the beginning of a proposed scope of work), the project's H&S Coordinator (Nadia Oliveira) will review the HASP with the designated Task Manager to determine the types of jobs/tasks required to complete the scope of work and whether potential job hazards are addressed or need to be addressed by the HASP.

The Task Manager will then assign the task of completing the JHA form to the designated field personnel. At that time, the Task Manager and the H&S Coordinator will discuss the tasks/steps required to complete the scope of work as well as potential hazards.

The designated field personnel will be responsible to complete the JHAs according to this SOP and based on the HASP.

Procedures for Completing the JHA Forms

A JHA will be completed for all jobs with potential hazards, including those that are addressed in the current HASP which has been approved by the Regional H&S Manager (John McCartney). The JHA form (attached) is used to complete the job hazard analysis for each task/step of the proposed scope of work which has potential hazards. Each task/step must be described accurately and succinctly in the appropriate column. The purpose of each column heading is described below:

- Principle Steps: To provide a list of steps required to complete the specific job on a daily basis.
- Potential Hazards: To determine the hazards associated with each step of the job.
- Recommended Controls: To recommend procedures and/or equipment needed to minimize the risk of injury posed by the job hazards.

- Safety Equipment: To document all the equipment/tools that will be used to complete the specific job. This field will also include the safety equipment necessary to complete the scope work. Equipment in the “Recommended Controls” field will be entered so that each unit of equipment occupies its own line in the “Safety Equipment” field.
- Inspection Requirements: Inspection requirements for each unit of equipment will be entered in this field. Every unit of safety equipment must be inspected prior to each use.
- Training Requirements: Training requirements for each unit of equipment will be entered in this field. Training assessments must be conducted by the Task Manager prior to the start of each job.

Procedures for Reviewing JHA Forms

Upon completion of the JHA forms by field personnel, the Task Manager and the H&S Coordinator will review them for accuracy and thoroughness.

New jobs and/or scope of work not addressed in the HASP

JHA forms that were completed for jobs and potential hazards that are not addressed under the current HASP must be reviewed and approved by the Regional H&S Manager. The approved JHA will be numbered sequentially as “JHA-[appropriate #]” and noted in the file named “Job Hazard Analysis Master List of Jobs” located on the server under the following link:

J:\Project\Ingersoll Rand\03710-173\Health&Safety\JHAform

The JHA will also be included with the HASP as an addendum.

Jobs already addressed in the HASP

If the job is addressed in the current HASP, the purpose of the JHA form is to serve as a quick reference guide for field personnel. The JHA, however, does not replace the HASP and all personnel are required to read the HASP.

Since the task is included in the HASP, separate approval by the Regional H&S Manager is not required. Therefore, these JHA forms will be reviewed by the Task Manager and H&S Coordinator. A JHA Number beginning with “JOB AID-[appropriate #]” will be assigned to the completed JHA and noted in the file named “Job Hazard Analysis Master List of Jobs” located on the server under the above referenced link.

Maintenance and Distribution of the Completed JHA forms

The “Job Hazard Analysis Master List of Jobs” as indicated above will be maintained and updated as necessary by the H&S Coordinator.

At least two days before the start of the scope of work, the Task Manager will distribute the appropriate JHA forms to personnel involved. The personnel should have been provided a copy of the HASP prior to this time. The JHA forms should be reviewed by the personnel so that appropriate safety equipment can be obtained and questions can be answered prior to the start of the scope of work.

EXAMPLE**Job Hazard Analysis (JHA) Master List of Jobs**

JHA Number	Title of JHA	Author	Date Completed	Regional H&S approval	Date Reviewed*	Reviewer (project position)
JOB AID-1	Salt Slug Test	John Doe	January 3, 2005	No	January 5, 2006	Jane Doe (Task Manager)
JHA-1	Traffic Control for Offsite Delineation	John Doe	February 10, 2005	Yes	February 15, 2006	David Doe (H&S Reg. Manager)

Lines highlighted in **YELLOW** are examples only and are meant to demonstrate how JHA documents should be logged and may be changed depending on the project. Please refer to a specific project's Master List of Jobs for accurate numbering and information.

*This column is meant to indicate a review of an approved JHA to confirm that procedures are current and appropriate.

Job Hazard Analysis Form
Describe Job/Task to which the JHA Applies
Project Name/Location
JHA Author

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS

Job Hazard Analysis Form
Describe Job/Task to which the JHA Applies
Project Name/Location
JHA Author

SAFETY EQUIPMENT (please include tools for the job)	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS

Is this task covered in a HASP reviewed by the Regional H&S Coordinator?

If no: This JHA form has been read and approved by the Regional H&S Coordinator on the following date:

 Name, Title

 Date

Attachment C

Health and Safety Plan Pre-Entry Briefing Attendance Form

Health and Safety Plan Pre-Entry Briefing Attendance Form

**Soil and Groundwater and Remediation
Former Ingersoll Rand Company Facility
942 Memorial Highway
Phillipsburg, New Jersey**

Conducted by:		Date Performed:	
Topics Discussed:	1. Review of the content of the HASP (Required)		
	2.		
	3.		
	4.		

Printed Name	Signature	Representing

Attachment D

Supervisor's Accident Investigation Report Form

H&S SOP NO: 4.2

SUPERVISOR'S ACCIDENT INVESTIGATION REPORT

Injured Employee _____ Job Title _____

Home Office _____ Division/Department _____

Date/Time of Accident _____

Location of Accident _____

Witnesses to the Accident _____

Injury Incurred? ____ Nature of Injury _____

Engaged in What Task When Injured? _____

Will Lost Time Occur? ____ How Long? ____ Date Lost Time Began _____

Were Other Persons Involved/Injured? _____

How Did the Accident Occur? _____

What Could Be Done to Prevent Recurrence of the Accident?

What Actions Have You Taken Thus Far to Prevent Recurrence?

Supervisor's Signature _____ Title _____ Date _____

Reviewer's Signature _____ Title _____ Date _____

Note: If the space provided on this form is insufficient, provide additional information on a separate page and attach. The completed accident investigation report must be submitted to the Regional Health and Safety Manager within two days of the occurrence of the accident.